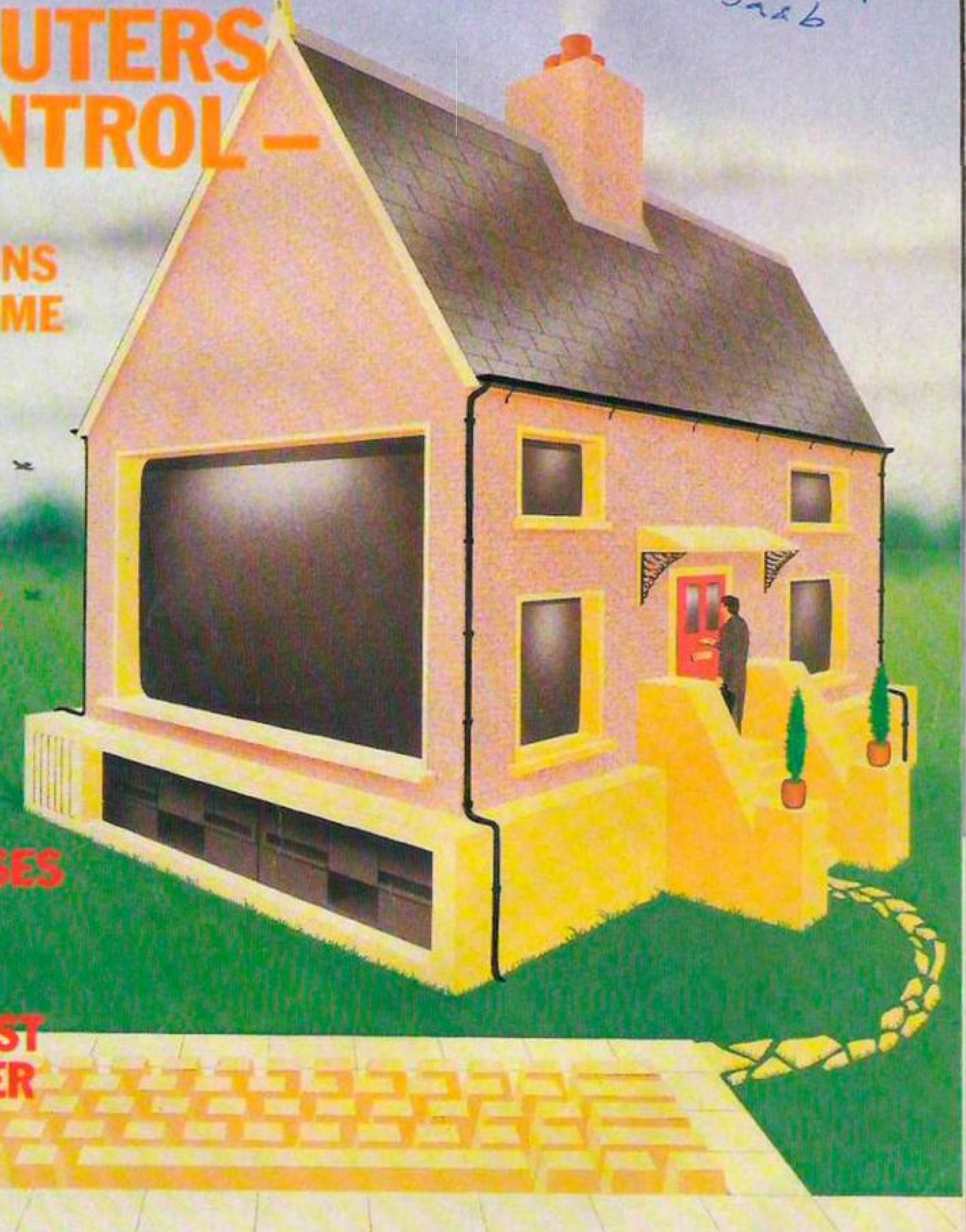
Your COMPUTER

► MARCH 1987 VOL. 7 NO. 3

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

COMPUTERS IN CONTROL – PRACTICAL APPLICATIONS FOR THE HOME



ADVENTURE REPORT – INFOCOM REVEALED

PC DATABASES COMPARED

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£100 of software yo
(Until mummy catc



With the Amstrad 464 home computer the fun starts as soon as you get it home.

Because unlike many other home computers the 464 comes complete with its own green screen or full colour monitor.

It also comes with a convenient built-in datacorder.

And you get £100 worth of software with games like Harrier Attack and Sultan's Maze. Not to mention Oh Mummy.

64K of RAM means you have plenty of memory to play with.





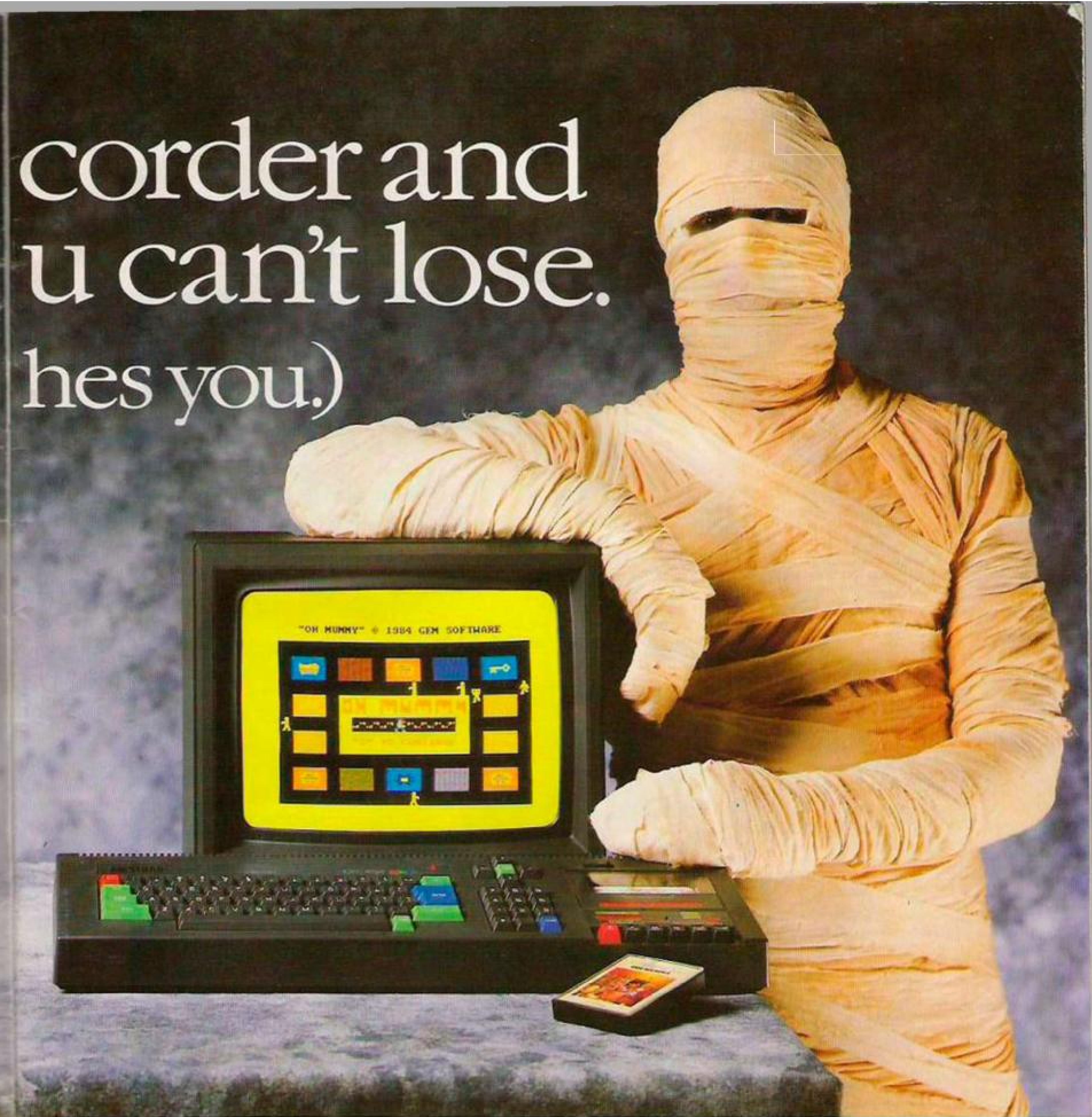
And there are over 200 Amstrad games you can play, many exclusive to Amstrad.

But games are only half the fun on the 464.

The kids can learn spelling and arithmetic with software like Wordhang and Happy Numbers.

Whilst adults will love the way that it helps around the house with budgeting and accounts.

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To help you make the most of your 464, you can join the Amstrad User Club.

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What's more you can buy joysticks, printers, disc drives, speech synthesisers and light pens to make it even more fun.

But perhaps the most pleasurable thing about the 464 is the price.

The complete home computer costs just £199 with green screen or £299 with colour monitor.

Not much to pay for a chance to get away from mummy.

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464 YC/03/87

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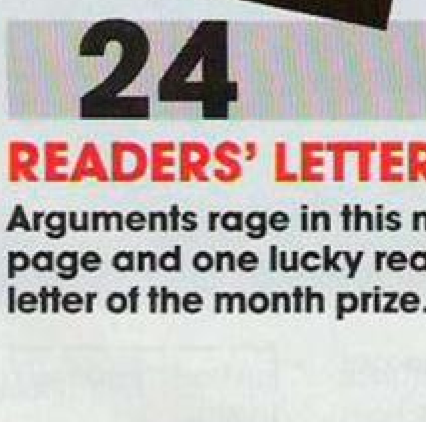
COMPUTIN

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home into a hous of t











TING YOUR HOME

for some insights into how to change your
use of the future.

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ADVENTURE SPECIAL

Infocom, probably the most respected name in adventure games, is the subject of an in-depth feature.



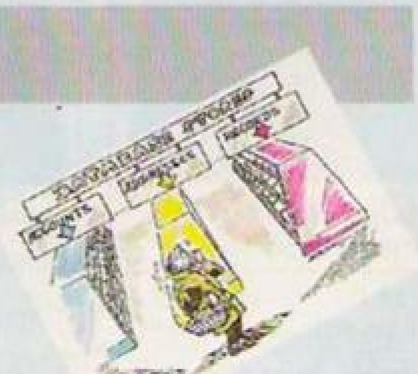


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Your COMPUTER

T. RICHARD JOHNSON.

COMMENT

A magazine's greatest asset is its readership, and it has become clear over the last few issues that *Your Computer* readers as a group are rapidly becoming more sophisticated as computer users. You are running increasingly powerful hardware and software to tackle applications which were just not viable with the older generation of systems. Naturally you expect in-depth coverage of the latest computers and programs but you also want a source of information on the best ways of using the technology available.

As personal computing evolves, *Your Computer* must evolve with it. Starting next month you will notice a number of changes. Every month we will bring you regular updates by the leading specialists in the subjects which interest you, including expanded coverage of communications, computer music, and hints and tips for adventure and arcade games. Also in the pipeline are forums on serious topics like programming techniques and computing for writers.

As new computing products become more and more sophisticated it becomes more difficult to make the proper choice. From now all major hardware and software reviews will include a run-down on the rivals, enabling you to make direct comparisons between the alternatives. Just because computing is a serious business that does not mean it has to be dull and there will be plenty in each issue to keep you entertained as well as informed.

Meanwhile, there is something you can do for us. Regular feedback from readers is the only way we have of knowing what you need from the magazine, what you like and what you do not like. So if you have something to tell us, let us hear from you. Please give us your thoughts by letter rather than by telephone – a written record of your views helps us build an overall picture, and at some times of the month pressures of magazine production prevent us handling as many telephone calls as we would like. Similarly, we cannot guarantee a personal reply to every letter, though we make every effort to answer through the letters pages when we are able to help with problems. Every letter is read carefully, however, and your opinions will be a significant influence on the way the magazine develops.

Try-it-and-see facility

British Monomarks has launched a free noticeboard facility to show potential subscribers to electronic mail systems such as Telecom Gold how easy and economical its Monodata desk-top system is to use.

Anyone with telecommunications equipment can access British Monomarks Monodata Noticeboard by setting their communications settings to 300 baud, 7 bits, even parity, 1 stop bit, ASCII.

Then dial 01-405 6062 and follow the prompts and instructions. The noticeboard will be updated on a regular basis to enable users to learn about additions to Monodata, along with details on British Monomarks other business services which include Telex, fax bureau, and a personal telephone answering service.

Amstrad chosen for Bible revision



The National Bible Society of Scotland has chosen an Amstrad PCW 8256 for a spelling revision of the Bible in Gaelic. The revision, the first of its kind to be undertaken since the translation was first completed in 1801, will be made by an expert Gaelic scholar Dr Donald Meek, who has been seconded to the Bible Society for one year to carry-out the work.

Most of the changes will be minor and will include corrections to typographical errors and some minor idiomatic changes.

The Amstrad will be interfaced to a photosetter using WordStar and the text to be keyed-in, some 800,000 words, will be handled by the Bible Society.

"Computer typesetting will enable us to produce the Gaelic Scriptures in a variety of typefaces and formats in response to popular demand. This revision will lead to the finest edition yet of the Gaelic Bible," the society says.

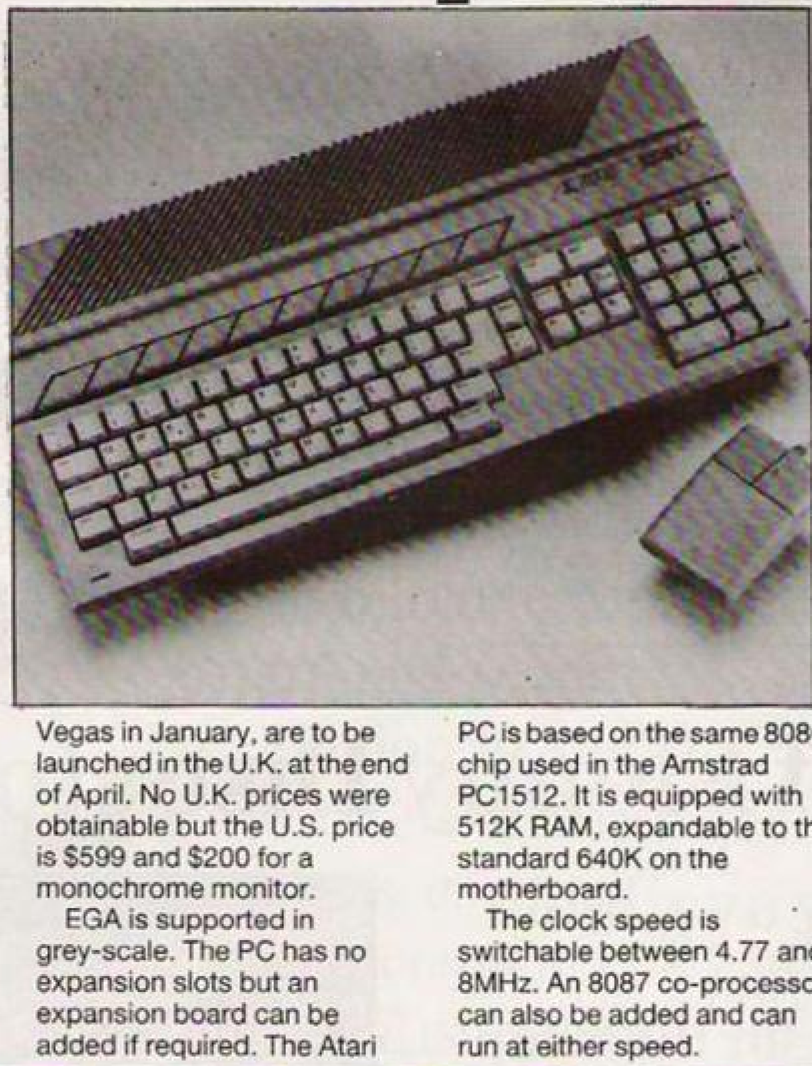
More power without the price

Atari has announced more price reductions for its ST range of computers, bringing 16-bit power in the form of the new 520 ST-FM down to £399.95. The 520 ST-FM is complete with 512K RAM and a 1/2MB disc drive built into the side of the machine similar in style to the 1040.

The cheapest Atari ST machine is the 520 ST-M, retailing at £259.95 + VAT. The user will need to buy a disc drive to use the machine, which will raise the price to close to that of the ST-FM.

Atari sees the move as allowing it to target its machines more precisely in three parts of the market, defined as the games sector, the home and educational market and the low-end business market.

The top-of-the-range machine, the 1040 ST-F, now retails for £899.95 and is complete with colour monitor, 1MB RAM, integral 1MB drive and mouse. The prices include VAT. The new Atari PC clones, shown for the first time at the CES show in Las Vegas in January, are to be launched in the U.K. at the end of April. No U.K. prices were obtainable but the U.S. price is $599 and $200 for a monochrome monitor.



EGA is supported in grey-scale. The PC has no expansion slots but an expansion board can be added if required. The Atari PC is based on the same 8086 chip used in the Amstrad PC1512. It is equipped with 512K RAM, expandable to the standard 640K on the motherboard.

The clock speed is switchable between 4.77 and 8MHz. An 8087 co-processor can also be added and can run at either speed.

Apple profit

Apple Computer revenue for the first quarter ending December 26 rose 24 percent compared to the same period a year earlier. Net sales were $662.3 million compared to $533.9 million last year. Net earnings were $58.5 million whereas last year they were $56.9 million.

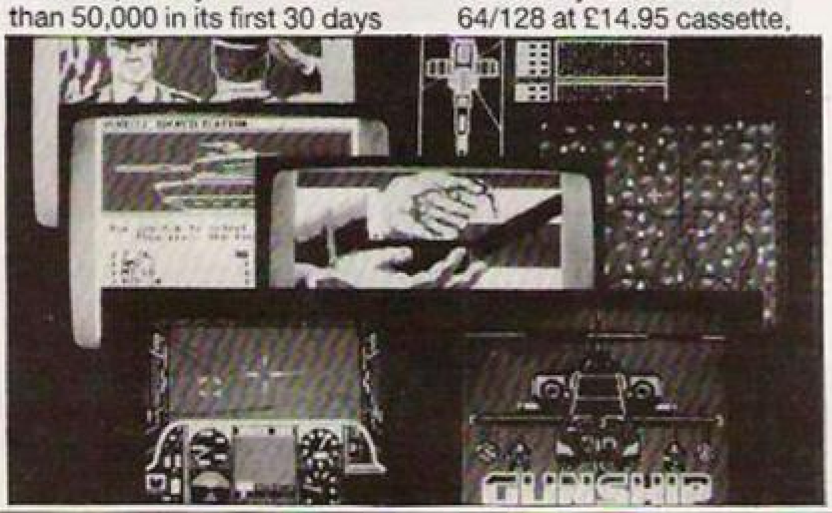
"We are especially pleased with our growth in revenue during the quarter," commented John Sculley, Apple chairman and chief executive. "Our Apple II GS has been well-received and our Macintosh products continue to achieve record sale levels.

"As we have stated for several months, we foresee a difficult comparison in our second fiscal quarter – January to March, 1987 – due to gross margin pressure and increased spending on new products planned for launch in the fiscal year."

David Hancock, managing director of Apple Computer U.K., said: "We are obviously pleased with the latest figures. They parallel our own success in the U.K. market, where we have had a strong growth in Mac-plus sales, as well as the launch of the Apple IIGS. Specific solutions in areas of business productivity, communications, desk-top publishing and education, *highlighted at our AppleWorld* exhibition in October, will lead our continual growth in 1987."

All guns for the U.K.

Gunship, the helicopter simulation from Microprose which reputedly sold more than 50,000 in its first 30 days of sale in the U.S., was launched in the U.K. at the end of January for the CBM 64/128 at £14.95 cassette, £19.95 disc, and is expected by the company to take the market by storm.



Gunship cost more than $1.5 million to develop and is "an accurate in every detail" simulation of the Hughes AH-64A Apache combat helicopter. The culmination of five man-years of game design, Gunship is one of the most adventurous Microprose projects. Before the final version was released, the game was play-tested by U.S. military helicopter pilots.

In a move against piracy, Microprose has serial-numbered each pre-release and review copy of the product to try to pre-empt pre-release piracy of the game. It is also insisting that recipients sign a non-disclosure agreement which permits Microprose to sue in the event of piracy. The move was welcomed by everyone in the industry and should help set a trend among manufacturers.

Another Star is born

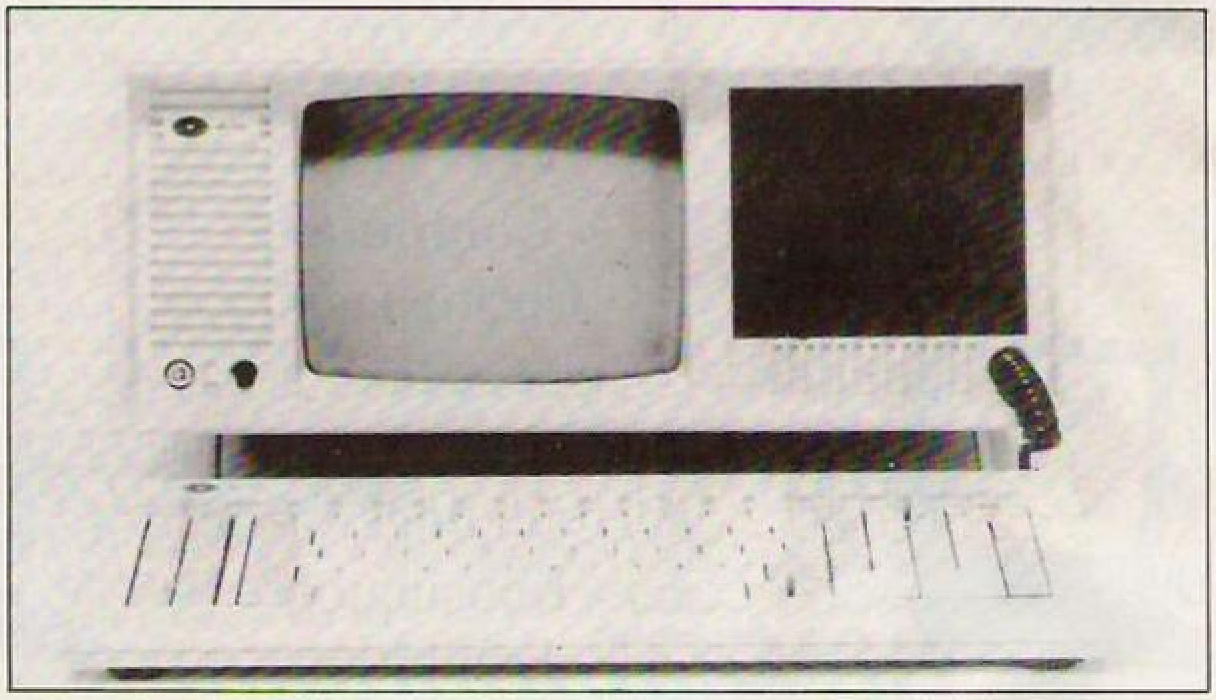
Star has announced the launch of its latest N series printer, the NX-15. Intended as a replacement for the successful SG-15, the machine costs £389 and, like all the N series printers, features a full front-control panel which saves the irritation of fiddling with the back or inside of the machine.

Included as standard are tractor and friction feed, together with an automatic single-sheet feeder for letterheads. The NX-15 is also fast, capable of 120cps in draft mode and 30cps in NLQ.

Typestyle selection, draft or NLQ, print pitch and form and paper controls are all touch-operated. Interfaces are available in either parallel or serial form and are easily connected to the printer.

Further information from Star Micronics U.K., Craven House, 40 Uxbridge Road, Ealing, London W5 2BS.

Walters launches new PC AT-compatible range



Walters International Ltd has launched two now low-priced AT-compatible machines and believes that it will give the company the most comprehensive AT-compatible range of any clone manufacturer.

The Baby AT, so-called because of its small footprint, 17in. x 16in. x 6in., costs £1,280 plus VAT and includes an eight-slot motherboard, 640K RAM expandable to 1MB on-board, a 1.2MB drive, 84-way keyboard, clock/calendar, mono monitor, Hercules-compatible display and a parallel printer port. The Baby AT uses an 80286 processor switchable between 6 and 8MHz. There is also provision for an 80287 maths co-processor.

Walters has also launched an AT-compatible portable for the same price as the Baby AT. Commenting that there was plenty of interest in the XT portable, Edward Moir, Walters sales director, said that people were looking for more power and so an AT portable was developed.

In external appearance the AT portable is almost identical to the XT but inside it has an AT-style specification. It uses an 80286 processor running at 6 or 8MHz and has provision for an 80287 maths co-processor. It has 640K RAM on-board, expandable to 1MB, and six expansion slots. The specification is identical to the Baby AT, apart from the integral 9in. mono monitor.



Sharp releases powerful new transportable

Sharp has released a new transportable computer, the PC-7100, which features a built-in 20MB disc drive and 320K RAM as standard, expandable to 704K. The LCD is said to be a vast improvement on previous LCD screens which, with electro-luminescent backlighting delivers improved image contrasting, giving a brighter, sharper display over a wider field of vision.

The keyboard is detachable and folds away conveniently for transport. The PC-7100 will retail for £1,995. In addition to the 7100, Sharp has released a companion model, the 7000A, an updated 7000 which features two 360K floppy drives.

Results round-up

Golden Trivia challenge



The winner of the heat of the Domark competition, in the September issue of *Your Computer*, was one of 13 finalists who competed for the prize of the Golden Trivia game featuring trays and segments die cast in solid gold and valued at £10,000. Entrants had studied the questions and were awarded 10 points for each correct answer. Iain MacNeil of Cardross, Dunbartonshire gained most points. He, together with four runners-up, in addition to taking part in the final with other heat winners, each received a copy of the Games II edition of Trivial Pursuit.

The runners-up were Salim Vohra, Ribbleton, Preston, Lancs; George Hooson, Bradford, Yorkshire; D M Williams, Thornton, Liverpool; and T Lafford, Barry, S. Glamorgan.

Other runners-up each received a pack of chocolates: C Vine, Clacton-on-Sea, Essex; R Cavil, Dewsbury, W. Yorks; R McDonald, Redhill, Surrey; S T Cronon, Wolverhampton, West Midlands; J Sender, Jordanthorpe, Sheffield; G Smith, Chellaston, Derby; C King, Hayfield, via Stockport, Cheshire; D Pickstock, Churchdown, Gloucester; R Chowdhury, Houghton Regis, Dunstable, Beds; and J Shaw, Liff by Dundee, Tayside. The winner of the Golden Trivia game was D J Cooke of Wibley, Portsmouth.



Colossus Chess

In the November issue of *Your Computer*, in conjunction with CDS Software, the Colossus Competition winners were: first, Andrew Skinner, Plymouth, Devon, who will receive a table-top Systema Turbo 16K Chess computer; second, Miss R Traylor, Plymouth, Devon, who will receive the portable Express 16K Chess computer. A copy of the Colossus Chess game goes to each of the 10 runners-up:

I M Fernandex, Isa Town, Bahrain; D T Cimatti, Llandudno, Gwynedd; G O'Mara, Tolworth, Surbiton, Surrey; R Shaw, Nailsea, Avon; W Davies, Skenfrith, Abergavenny, Gwent; Avril Corbett, Halifax, West Yorkshire; D Casnin, Killinardan, Tallaght, Dublin; L Dahlen, Dals-Laanged, Sweden; J Jacobsen, Glostrup, Denmark; F T Holt, Clanfield, Portsmouth; and E A Cook, Llanfrechfa, Cwmbran, Gwent.

Firebird winners

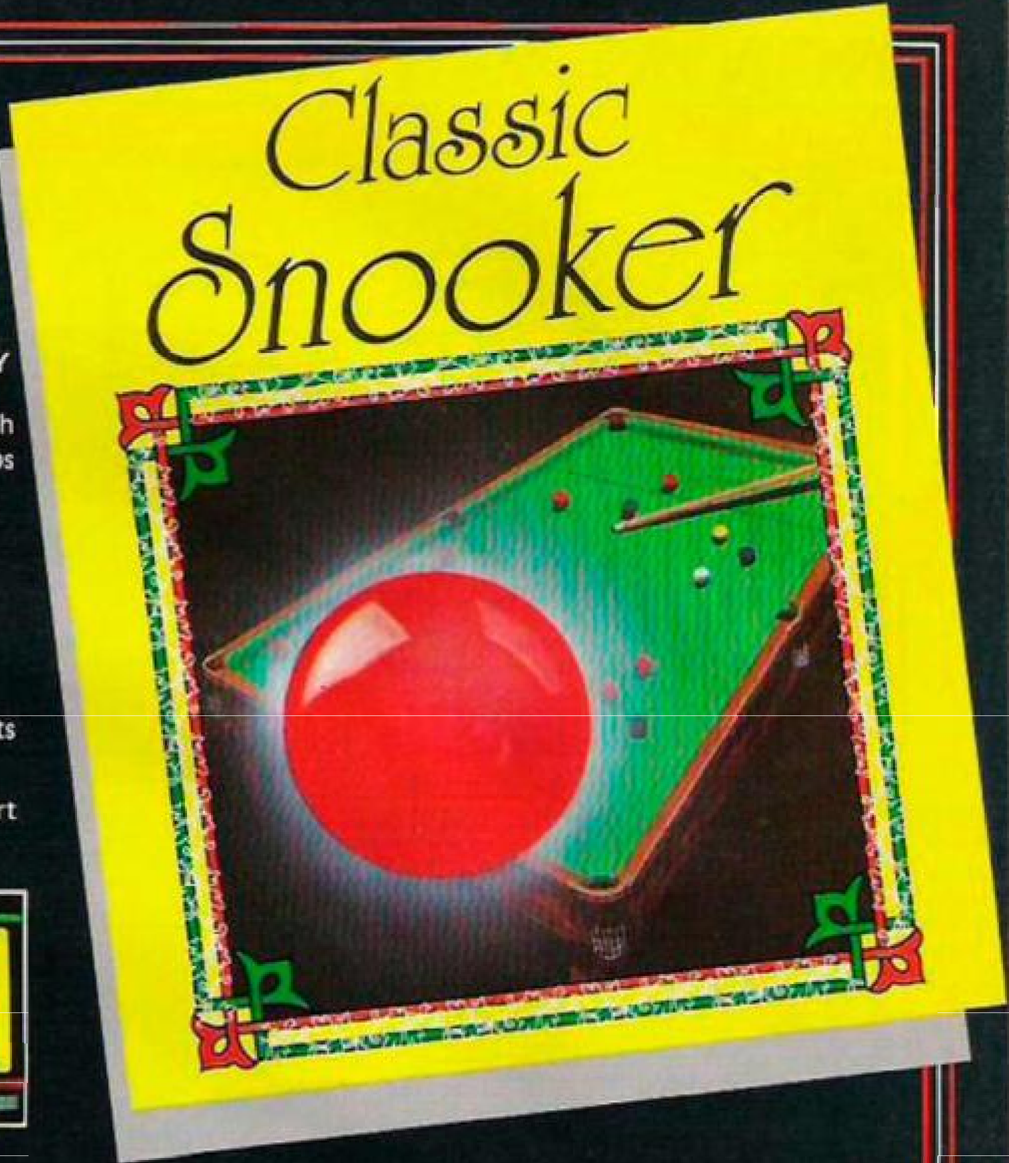
The Firebird Competition, in the November issue of *Your Computer*, was won by Sean Minter, Congleton, Cheshire. He receives a superb framed picture of the cover as used in magazine advertisements. The runners-up who received two Firebird games are:

Carla Mayers, Thornhill, Cwmbran, Gwent, Paul Mighall, Tunbridge Wells, Kent; David McMahon, BFPO 24; Martin Birch, West Leigh, Havant, Hampshire; Jason Dobbs, Newton Abbot, Devon; Jorgen Jacobson, Glostrup, Denmark; D M Williams, Thornton, Liverpool; Kieron Haywood, Llandudno Junction, Gwynedd; Gerard O'Mara, Tolworth, Surbiton, Surrey; Michael Davies, Llandeilo, Dyfed; David Conner, Aintree, Liverpool; Stephen Dhesiu, Charlton, London; N Brownlee, Wester Langlee, Galashiels, The Borders, Scotland; and Richard Hood, RAF Gatow, BFPO 45.

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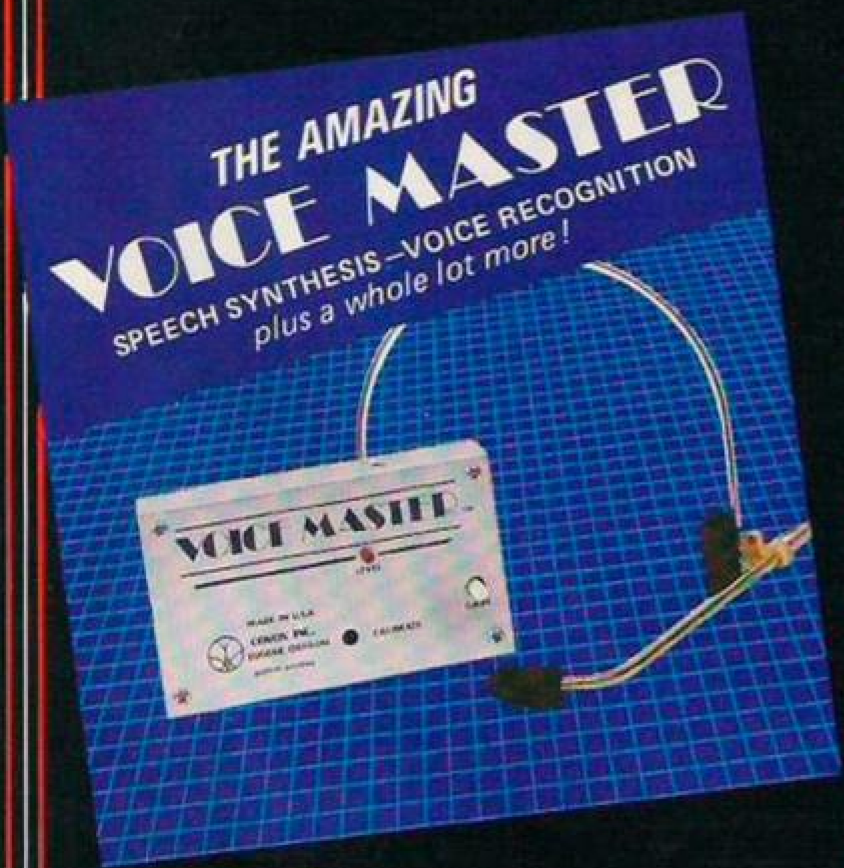


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MicroScope GALLUP

MicroScope is the weekly trade paper of the microcomputer industry. If your computer store doesn't display the latest *MicroScope* chart, ask the manager to call Mark Salmon on 01-631 1433 — we'll send a copy every week.

THE CHARTS

TOP 20

1	GAUNTLET	U.S. GOLD	SP CO AM
2	COMPENDIUM OF HITS 10 VOL. 3	BEAU JOLLY	SP CO AM AT BB MS C1 EL
3	PAPERBOY	ELITE	SP CO
4	TRIVIAL PURSUIT	DOMARK	SP CO AM AT BB
5	SPACE HARRIER	ELITE	SP CO AM
6	KONAMI'S COIN-OP HITS	IMAGINE	SP CO AM
7	FOOTBALLER OF THE YEAR	GREMLIN GRAPHICS	SP CO AM MS C1
8	HIT PACK	ELITE	SP CO AM C1
9	FIVE STAR GAMES	BEAU JOLLY	SP CO AM BB MS C1 EL
10	COBRA	OCEAN	SP CO
11	SCOOBY DOO	ELITE	SP CO AM C1
12	SUPER SOCCER	IMAGINE	SP
13	BREAKTHRU	DATA EAST – U.S. GOLD	SP CO AM
14	THE GREAT ESCAPE	OCEAN	SP AM
15	HEAD COACH	ADDICTIVE	SP CO
16	THEY SOLD (3)	HIT SQUAD	SP CO
17	INFILTRATOR	MINDSCAPE – U.S. GOLD	SP CO AM
18	KONAMI'S GOLF	IMAGINE	SP AM
19	REPTON 3	SUPERIOR	CO BB EL
20	TOP GUN	OCEAN	SP AM

BUDGET TOP TEN

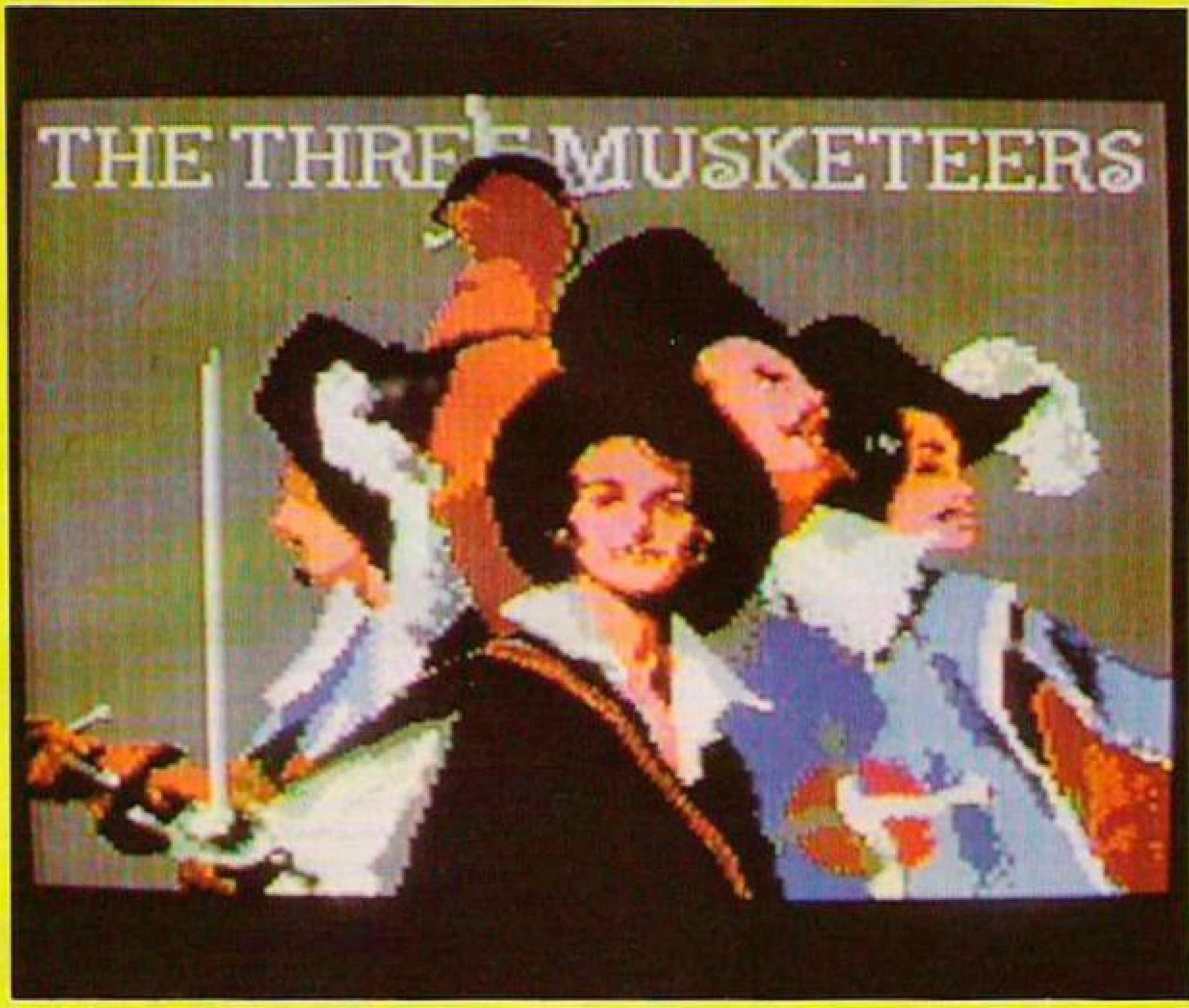
1	180	MASTERTRONIC	SP CO AM
2	OLLIE AND LISA	FIREBIRD	SP
3	BMX SIMULATOR	CODE MASTERS	SP CO AT
4	FLASH GORDON	MASTERTRONIC	CO
5	NINJA MASTERS	FIREBIRD	SP CO AM AT MS
6	HAPPIEST DAYS	FIREBIRD	SP CO
7	SPEED KING 2	MASTERTRONIC	SP
8	AMERICAN FOOTBALL	BUGBYTE	SP CO
9	THRUST	FIREBIRD	SP CO AM AT BB EL
10	VAMPIRE	CODE MASTERS	SP AM MS

BUBBLING UNDER

CRYSTAL CASTLES	U.S. GOLD	SP CO AM BB EL
DRACULA	CRL	SP CO AM
HYPABALL	ODIN	SP CO
NINJA	MASTERTRONIC	SP CO AM AT
PANTHER	MASTERTRONIC	CO
RED MAX	CODE MASTERS	SP CO AT
SCALEXTRIC	LEISURE GENIUS	SP CO
TERMINUS	MASTERTRONIC	SP
TERRA CRESTS	IMAGINE	SP CO AM

MACHINE CODES:
SP = SPECTRUM; CO = COMMODORE; AM = AMSTRAD; MS = MSX; AT = ATARI; V2 = VIC20

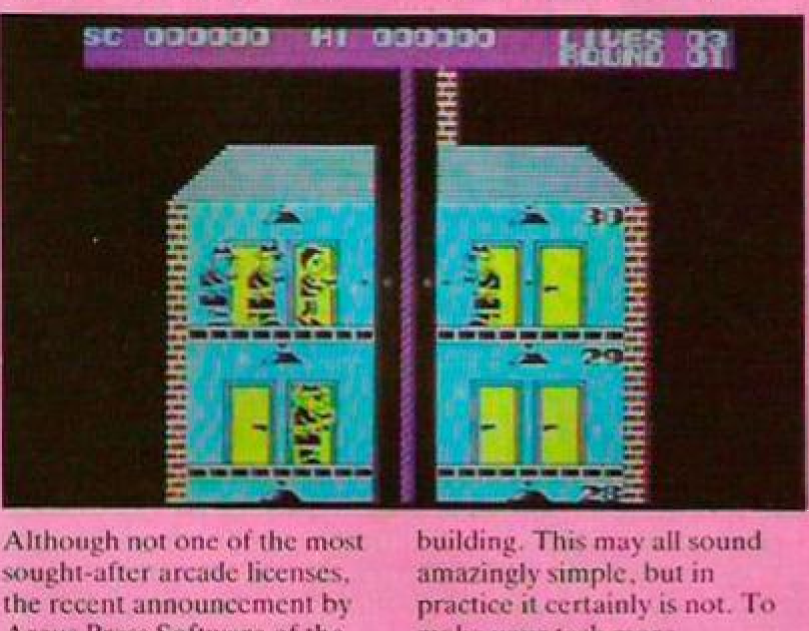
All for one and one for all . . .



A new company, Computer Novels, has just announced the imminent launch of its first title, *The Three Musketeers*. Based on the famous novel by Alexander Dumas, the game initially will be released for the Commodore 64, 128 and Amiga. The tape version for the Commodore 64 consists of four separate loads, each containing more than 63K of data, so the quality of the graphics should be really good.

The game also contains six new scores lasting, in total, more than 15 minutes, so the game really should be a cracker.

Action stations



Although not one of the most sought-after arcade licenses, the recent announcement by Argus Press Software of the imminent arrival of its *Elevator Action* conversion should bring back fond memories for some arcade gamesters.

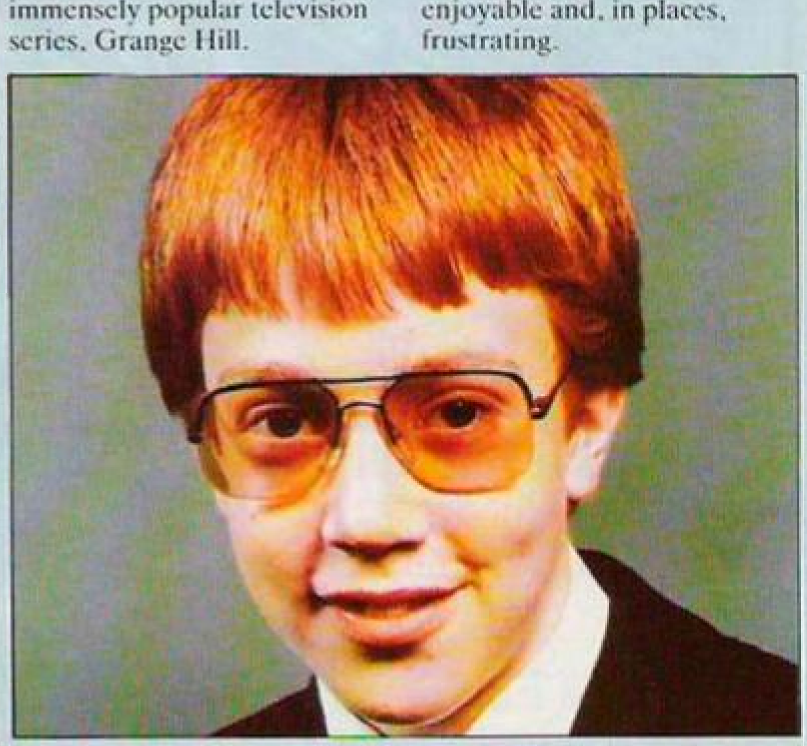
The game places the player as a spy, who must travel from the top of a liftshaft, right down to his getaway car which is at the bottom of the building. This may all sound amazingly simple, but in practice it certainly is not. To make your task more complicated, there are various mac-cloaked baddies who would like nothing better than to pump you full of lead.

Although a simple idea, in the arcades the game played very well, and that addictiveness will be carried on to the range of home micros for which it is being converted.

Home on the Grange

To tie closely with the tenth anniversary of the series, Quicksilva has licensed the name and characters from the immensely popular television series, Grange Hill.

The game uses the characters Hollo and Gonch and revolves round their attempts to break into school to recover a confiscated personal stereo. Designed by Colin Jones, who was also responsible for two CRL hits, *Deux Ex Machina* and *iD*, the game promises to be both enjoyable and, in places, frustrating.



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3. *Which company invented the VHS format?*



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- ★ The winners of the competition will be the first five correct answers drawn from all those received before the closing date of the competition.
- ★ The names of the winners will be announced in the June 1987 issue of *Your Computer*.
- ★ All entries must arrive at the *Your Computer* offices by the last working day in March, 1987.
- ★ Each person may enter the competition only once.
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Yellow Pages on-line

BT has launched its Electronic Yellow Pages service, a condensed on-line version of the printed directory. Advertisers who wish to appear in the new service have to buy extra space, in addition to their standard business telephone entry.

Electronic Yellow Pages runs on its own computer database. It offers both scrolling text and viewdata format display, accessible at a variety of speeds from 300 to 1,200/75 baud. The service is also available via a gateway link on Prestel. Apart from the cost of your telephone call, the service is free.

Initially the service is limited to London, Reading, Guildford, Watford and St. Albans.

Banks agree on point of sale

If you are a regular traveller to France or Germany, you will probably have noticed how many retailers, from modest hotels and petrol stations to department stores, use electronic credit card readers linked to large credit card organisations like Visa and Mastercharge (Access). In the U.K., both banks and retailers have been slow to make use of this new technology.

The top U.K. clearing banks recently agreed on a future Electronic Funds Transfer at Point of Sale system which eventually will be featured countrywide.

The system, which could spell the end of the paper chequebook as we know it, will be card-based and may use "smart cards" – plastic cards with tiny integral microcomputers.



Acorn starts communicating

The Acorn answer to the Sinclair QL-based ICL One Per Desk comms-orientated desk-top micro, the Communicator, which was launched more than a year ago as an OEM product, has finally secured some customers.

Around 2,000 of the 65C186-based micros, with integral modem and telephone handset, are believed to have been ordered, including 500 by Thorn EMI Business Communications division and an unspecified number by Pickfords Travel, for its 350 high street branches, to act as all-purpose business micro/viewdata terminals.

The 16-bit Communicator, which is similar in appearance to the Acorn BBC Master Compact, is a complete turnkey comms solution, with integral business applications – View WP and Viewsheet calc-sheet – which can be expanded by software development.

The latter feature was one of the main reasons Pickfords chose the Communicator.

Three-and-a-half-inch disc drives and up to 20MB of hard disc storage are available as optional extras. Acorn would not disclose how much the Communicator costs but we suspect that the standard configuration, with keyboard and colour monitor, is around £1,000.

Pace reduces prices

The Series 4 range of smart modems from Pace Microsystems has been reduced in price "because of reduced component costs" according to Barry Rubery of Pace. With Prestel due to launch its new high-speed Vascomm network soon, it is no surprise that the 1,200S (with 1,200/1,200 baud V22) and 2,400S (up to 2,400 baud V22bis) have been reduced in price – from £479 to £399 and £619 to £499 respectively. The standard V21/23 (300 and 1,200/75 baud) version remains unchanged at £265.

Cheaper Minitel terminal

The price of the Alcatel Terminatel 254 combined Prestel/Minitel terminal has been reduced by £105 to £295. Alcatel announced the price reduction to celebrate the sale of its two millionth Minitel terminal.

Ninety-nine percent of those terminals are Minitel-only versions of the compact mono-display terminal used in the French electronic telephone directory program.

U.K. importer, Blick, is not claiming exciting sales figures for the terminal, though Alcatel appears pointed to start large-scale manufacturing in the U.K., should a large-scale French-style electronic directory scheme get under-way.

Most observers agree this will happen eventually.

Miracle soon

Miracle Technology has increased both the specification – extra control LEDs – and price, up £20 to £169.95, of its base smart modem. That compares favourably to the similar model WS3000 – both are Hayes-compatible V21/23 modems which can be upgraded internally to V22 or V22bis.

The WS4000 is to appear soon in PCW-compatible form – interfacing directly to the Amstrad PCW, without taking up the PCW optional RS232 interface. The price is expected to be the same as the new standard WS4000.

Compulink expands

Guildford-based bulletin board Compulink, well-known for its PC support, will soon be expanding to cater for Amiga users. The board, which has more than 3,000 subscribers, specialises in articles and software support, including Freeware public domain software, for IBM PCs and compatibles. New Amiga-based subscribers will be able to download a large selection of free public domain Amiga software – 37 discs full.

Access to Compulink, which occupies the top floor of a modest terraced house in Guildford, can be via 300, 1,200/75, 1,200 full duplex or 2,400 baud. Full details can be obtained from Compulink on 0483 65895.

Gaming on the PCW

At first glance, the specification of the PCW is scarcely one which would endear itself to games programmers but, as Ocean proved with Batman, it is possible to produce excellent games on this monochrome machine. Michael Graham and Francis Jago examine some of the best.

Bounder

One of the biggest surprises in the computer games world was the failure of the original versions of *Bounder* – for the Amstrad, Commodore and Spectrum it is uninteresting. The object is to guide your bouncing ball along various courses, with the screen scrolling vertically, top to bottom, trying to avoid the various objects which will kill you.

If you complete a level and still have some of your allotted bounces left, you must then attempt the bonus screen, in which every block on which you manage to land will give you a bonus, although the bonuses will vary from 500 to 10,000 points.

Graphically, Bounder is surprisingly good on the PCW, and indeed many of the defined sprites seem better in green than in the original multi-colours. The only obvious criticism of Bounder is that it is, at least on this machine, too slow. Whether it is absence making the heart grow fonder is not certain but the other versions were considerably faster. That apart, Bounder is still highly playable and should provide a refreshing alternative to hours spent tapping away at LocoScript.

Contact Gremlin Graphics on 021 356 3388.

Frank Bruno's Boxing

It now seems that the PCW is officially recognised as a games machine; not only Ocean but Elite is getting in on the act. The first game Elite is releasing for the PCW is still one of its best early products, namely *Frank Bruno's Boxing*.

Although Frank never made it to the top his name is still well-respected by the general public and that can only help sales of this game.

The object of the game is to work your way through the eight various boxers, defeating each of them as quickly as possible. Points are awarded on a depleting bonus system, and therefore getting



three knockouts quickly is what the game is about.

To complete the game, there are eight boxers, ranging from easy to almost impossible, all of whom you must defeat. The first competitor you contact is Canadian Crusher, a giant of a man who lumbers uselessly round the ring in an attempt to squash you.

As the boxers get more difficult, and correspondingly more dirty, the game starts to depend slightly on a degree of dexterity, especially as you have to use seven separate keys most of the time. For a first game on the PCW, FBB is both enjoyable and well converted. If it sells well, Elite promise more conversions; there can be no better reason for buying this game, except that it also happens to be an excellent one.

Contact Elite on 0922-55852.

Micro Trivia

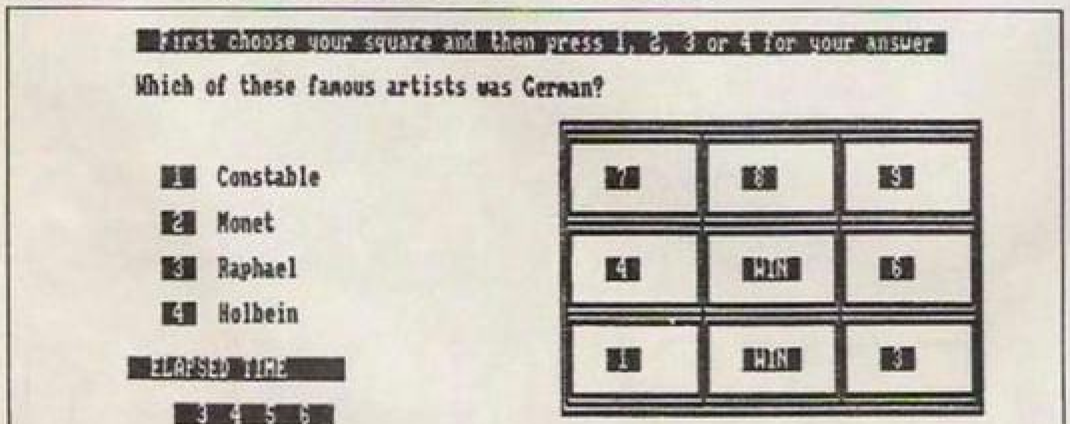
The PCW is an excellent machine but animated graphics are not its forte. Therefore, any game designed specifically for the machine is unlikely to use graphics. One of the more enjoyable quiz games to reach the office recently is *Micro Trivia*.

Unlike its auspicious cousin, *Trivial Pursuit*, this game uses noughts and crosses, combined with questions to add to the excitement of the game and, as an added bonus, there is a chance to win a £1,600 cruise up the Nile.

In the version of the game we had, there were 1,000 general knowledge questions, although the producers of the game have promised that they will release 10 new groups of 1,000 questions in the near future. To get a chance to enter the competition, you must first achieve a score of at least 150 – no mean feat.

In a slightly jocular vein, the authors have included a busy button which, when pressed, changes the screen into a fairly good representation of a word processor – very useful if the boss insists on checking on you. Overall, Micro Trivia is an excellent quiz game, it is easy and yet frustrating and should appeal to the Mensa-like group of people who love to see just how clever they are.

Contact Harold Gale Associates on 0902-772771.



Software standards

Stewart Bell, managing director of Microprose, has criticised entertainment software houses for not catering for the increasingly-sophisticated micro user. He believes that as machines are becoming more sophisticated so, too, are the end-users, but he says:

"There are far too many software houses which are apparently working on the assumption that end-users have IQs less than orang-utangs."

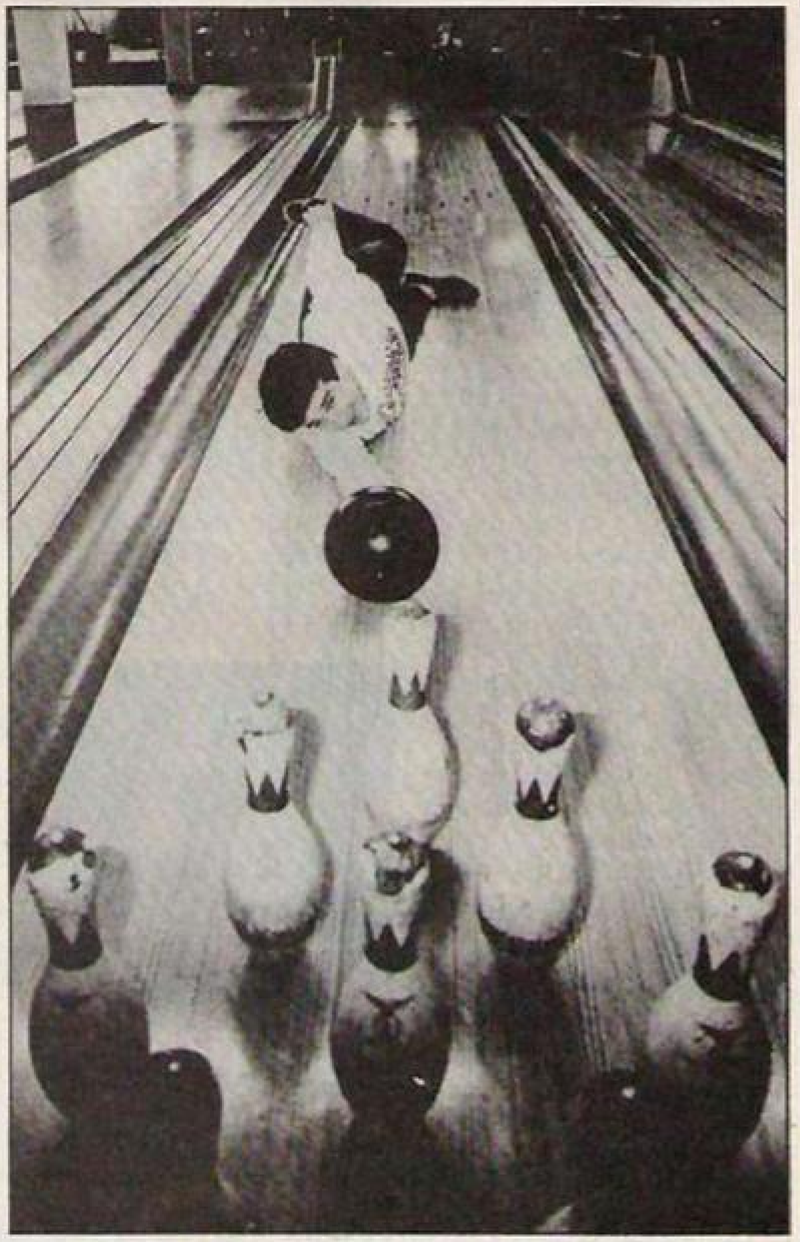
According to Bell, the result of all this is that the entertainment side of home computing is not achieving its full potential and that sales are being lost through bad experience with poor quality games.

Despite the criticism, no constructive advice has been offered by Bell to help solve the problem.

Slip-sliding away

This picture shows U.S. Gold public relations chappie Richard Tidsall in a very compromising position designed to attract attention to the latest Access sports simulation, *Tenth Frame*. Based, as the picture suggests, on ten-pin bowling, the game is both well executed and great fun – as would be expected from the company which produced *Leaderboard*.

Due to be released for the Commodore, Spectrum and Amstrad very soon, with Amiga and Atari ST versions to follow, it should be in the shops by the time you read this.



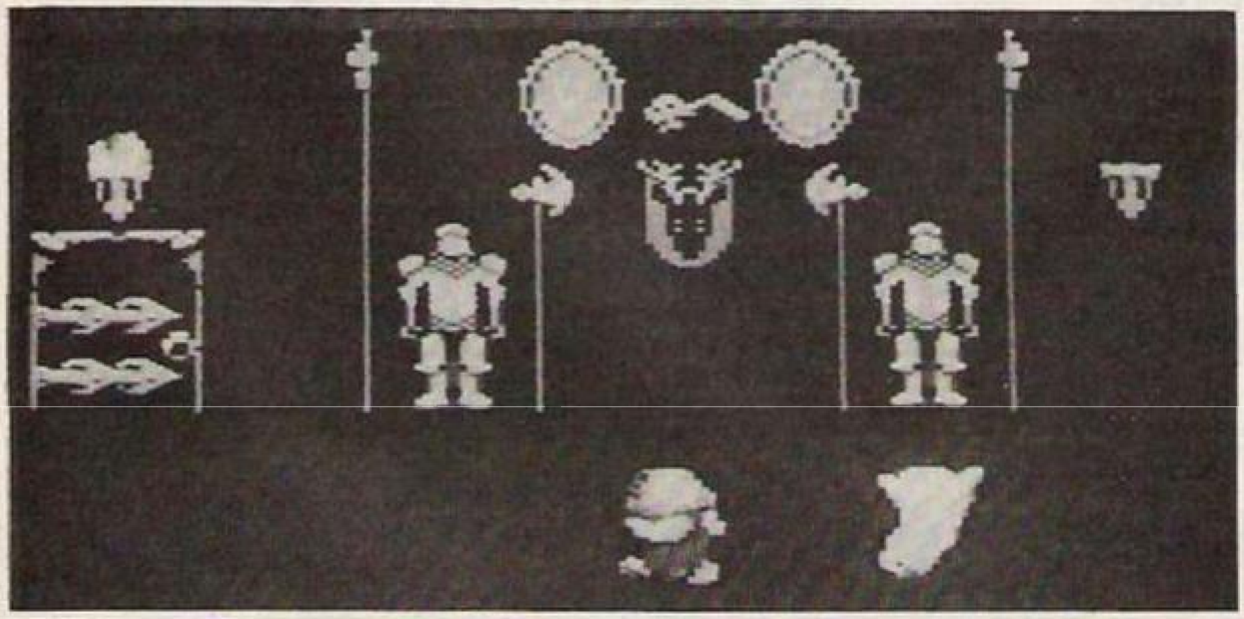
Knight and day

Succumbing to the success of *The Pawn*, Level 9 has announced that its latest adventure, *Knight Orc*, will feature state-of-the-art digitised graphics to add to the atmosphere of the game.

Knight Orc features the ability to communicate with, and give commands to other characters, as well as those characters leading their own lives, independent of you.

Using a new language interpreter with multiple command sentence and a 1,000-word vocabulary, the game promises to be one of Level 9's best.

Frankie says 'Ariolasoft'



Latest game for Amstrad and Spectrum owners from Covent Garden-based Ariolasoft is *Bride Of Frankenstein*. In this spoof game, it is your task to revive your beloved (oh yeah?) Frankenstein before the wedding day. To do this you must rob graves and crypts, in search of a pair of lungs, kidneys, a liver, a brain and a good heart to bring your hubby to life.

To stop you in this task there are lost souls who would like nothing better than to see you cop it, and a variety of hideous ghoulies and zombies.

Letters

Please don't knock the Amiga

I want to say I am disgusted at the way that you have been putting down the Amiga ever since it appeared. You have always been attacking it from price reviews to software reviews. Your review about the Amiga in Santa's Selection in the December issue was altogether disgusting. First you attack the price. My answer to that is that the high-level price of the Amiga is for a high-level person. If someone is serious enough about computing to buy such a high-level computer, you can be sure he is willing to spend a high-level price.

What you said about the software is altogether a lie. The Amiga has almost as much software as the Atari ST, at least 100 pieces. Most of the software is from Electronic Arts and Mindscape. There are at least two great word processors which I have. They are Regis-write and one other I do not know the name of. That is in contradiction to what you said in the article that to this day there is not one good word processor available.

I am saying this because I own an Amiga. It is the best computer on the market and you know it. No other computer offers you 640/400 graphics, 4,096 colours, four-channel stereo all together, with just as much software as the ST. Even where I live we have all the software for the Amiga including great graphic word processors, mostly from Aegis.

Nathan Singer,
Safed, Israel.

Editor's reply: Although I would not say that we have been putting down the Amiga, I would like to try to justify the obvious lack of coverage. No-one would argue other than that the Amiga is an excellent machine, especially when it is used for vertical applications. On the other hand, our criticism of price seems now to have been proved correct as Commodore U.S. is now releasing a new Amiga, the A500, which will have 512K as standard and sell for less than $700 – roughly £500.

As for the lack of word processors, I use an Amiga at home and I still stand by what I say about the inadequacy of any of the current batch, including the Commodore Textcraft.



New Amstrad User Group

A new Amstrad user group has been set up just outside the centre of Birmingham and we would welcome new members wishing to join us. If you enjoy computing with your Amstrad, whether it is playing games or writing *dBase II* programs, we would be delighted to hear from you.

John Woods,
Secretary,
Birmingham Amstrad Users' Group,
54 Lockwood Road,
Northfield,
Birmingham B31 1QD.

Amstrad CPC no match for Atari games graphics

I am writing about D. Jenkins' letter claiming that the Amstrad CPC machines were the 'Games machines of the future'. What a load of trash. I own an Atari 520STM and while still considered a business micro, I feel its ability to produce games with graphics such as *Starglider* proves that the real games machines of the future will surely be the ST or similar quality machines.

While still probably a little too expensive for home use, the price should fall in the future and even now is good value. I am not denying that the CPC range is a pleasant home micro but it certainly is not in the ST league.



I would like to thank *Your Computer* for its coverage of the ST and I hope to see more reviews and perhaps some programs.

Gary Marshall,
Aberdeen.

Editor's reply: The ST seems to be the games machine of the future, especially as Atari has now reduced the price even further. It has now reached the stage where anyone buying a computer for games purposes only must take the ST into consideration. With games at an average of £25 each, however, I think the Commodore, Amstrad and Spectrum still have a few years at the top.

Star rating or percentage system?

I have been reading *Your Computer* for the last two years and the software shortlist has been of constant interest to me. Although I find your reviews interesting and informative I have one major criticism – that is that you rate out of only five stars. That leaves a non-precise summary to otherwise excellent reviews which leaves many readers in a dilemma about possible purchases.

The situation is even worse when the overall rating is three stars, as the over- or under-generosity of the reviewer can be the difference between a bad game and a reasonable one.

Alternatives to your present rating system would be either 20 stars – as 10 can still be a little restrictive – or a percentage rating system, as employed by many of the top game reviews magazines.

M. Knight,
Harrow, Middlesex.

Editor's reply: I agree with you and in the near future we will try to think of a more reflective rating system, though it will have to be original as well as useful.



Firmware guide was available

Richard Sargent complains – Vol. 7 No. 1 pages 66-67 – "If only Amstrad had produced its disc firmware guide in time."

I would like to point out that the disc firmware guide has been out for many, many months and the original Firmware Guide, which contains all the routines he requires for saving files to disc, came out at the same time as the CPC464 more than two years ago. In fact, the Firmware Guide was in the hands of some software houses before the CPC464 reached the market. That is why so many games appeared at the same time as the computer.

I wish people would get their facts correct before knocking this machine. All too often people have a go at the Amstrad. I have yet to see any derogatory comments about the CPC computers which have any foundation in truth.

I agree with Jenkins when he says that the Amstrads are far superior to Spectrums. Consider the amount of space given to Spectrum listings which provide extra Basic commands such as on error goto, renumber, block delete, auto line numbers, all standard on CPC machines.

Next consider the number of advertisers offering repair facilities and proper keyboards. To me at least for an Amstrad owner the purchase of a Spectrum can only be a step back into the stone age. Yet for a Spectrum owner to purchase an Amstrad, it is only a logical step forward into the world of real computers.

Alex Aird,
Birmingham.

MAN LOGIC

By NEIL BRADLEY



The Commodore plot

In this month's programming conspiracy, Owen and Audrey Bishop collaborate to design fast graphics routines for your CBM64.

When it is a matter of graphics or sound routines, not even Jack Tramiel could claim that the CBM64 is user-friendly. Yet here is a computer with sound and graphics facilities still superior to those of most of the popular computers marketed since the CBM64 first appeared. It is the POKEs which make it difficult. Not only do you have to know which address to POKE and what value to POKE to it but you need to check your typing with great care.

One false digit and there is the inevitable hang and a blank screen. Switch off and start again. That leads us to the most important of all programming precautions. Never try to run a newly-typed Commodore program without saving it first.

This month we present some fast machine code routines intended to take the hassle out of Commodore graphics and, incidentally, to help you to put bright and lively pictures on your screen. The routines make use of the *multi-color bit-map* mode. In this mode the screen is considered to be made up of 200 rows each of 160 dots, or pixels. Each of the pixels is identified by its x and y co-ordinates – figure one. Each pixel is displayed in one of four colours. Colour 0 is the same colour as the screen in text mode. Colours one to three can be any of the first eight Commodore colours – table one.

Colour codes

Note the difference between the colour numbers and colour codes. Colour numbers refer to the four colours – 0 to 3 – you can have in each character block, an area of screen four pixels wide and eight pictures deep – see figure one. The four numbered colours are usually all different, though two or more could be the same colour. Colour codes refer to the eight Commodore colours – table one. We use the colour codes when allocating specific colours to colour 0, colour 1, colour 2 and colour 3. If you find that confusing, take comfort in the though that Amstrad owners have the same difficulty in distinguishing between its keywords PEN and INK.

The four-colour mode has a little more to it than at first appears. Colour 0 applies to the whole screen but a different selection of colours 1, 2 and 3 can be set for each character block. That means you can have up to eight colours on the screen at once.

Figure two shows how we have allocated the CBM64 memory in our graphics system. Note that the bottom 32K is left entirely free for the Basic program and variables, except for the small area below $0401, which the



computer always needs for its own purposes. Thus you have plenty of program space. Eight kilobytes of memory from $8000 onwards is reserved for the machine code routines. That

```
50 REM *********GRAPHICS PROGRAM ********
60 POKE 53281,5:POKE 40957,0:POKE 40958,
2:POKE 40959,3:REM COL0 TO COL3
70 SYS 32815
80 A=.003
90 A=A+.0209:R=50*(1-COS(A)):X=INT(80+R*
SIN(A)):Y=INT(100+R*COS(A))
100 IF X<0 OR X>159 OR Y<0 OR Y>199 THEN
 GOTO 120
110 POKE 40954,2:POKE 251,X:POKE 253,Y:S
YS 33016
120 IF A<6.28 THEN GOTO 90
130 FOR J=1 TO 8000:NEXT
900 REM *****END OF GRAPHICS PROGRAM****
*
```

space is required only partly for our routines, so you have room here to store your own machine code or data tables.

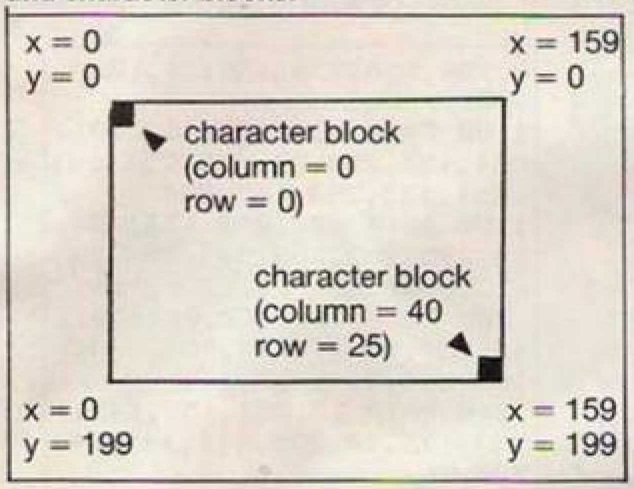
The screen routines make use of the 16K block of RAM from $C000 onwards – HIRAM. In normal operation of the computer, that block holds the Kernel ROM, 4K of input/output addresses and buffers, and the character ROM. The 16K of RAM normally is unused; many Commodore users are probably unaware of its existence. If you POKE addresses in this area, the value POKEd is stored in the RAM but if you try to recover the value by PEEKing the address, all you get is the value from the kernel ROM.

Character memory

By making the CPU switch a certain control line – HIRAM – low, we can switch out these ROMs. Then we can PEEK values directly from the hidden RAM. That cannot be done from a Basic

program, since switching out the ROMs deprives the Basic program of essential routines and information. From a machine code routine which runs independently of Basic, there is no problem.

Figure 1. Graphic co-ordinates and character blocks.




```
10 REM *** PLOT ***
20 PRINT CHR$(147):PRINT"STORING CODE"
30 FOR J=32768 TO 33172:READ X:POKE J,X:
NEXT
40 SYS 32768
50 REM *********GRAPHICS PROGRAM ********
60 POKE 53281,5:POKE 40957,0:POKE 40958,
2:POKE 40959,3:REM COL0 TO COL3
70 SYS 32815
80 POKE 40954,2
90 FOR J=0 TO 150:POKE 251,J:POKE 253,J:
SYS 33016:NEXT
100 FOR J=1 TO 8000:NEXT
900 REM *****END OF GRAPHICS PROGRAM****
*
910 SYS 32971:POKE 53281,6:POKE 53282,14
920 PRINT CHR$(147):PRINT"PROGRAM FINISH
ED"
930 END
970 DATA 169,128,133,52,133,56,173,24,20
8,9,8,141,24,208,173,17,208,9,32
980 DATA 141,17,208,173,22,208,9,16,141,
22,208,173,2,221,9,3,141,2,221
990 DATA 173,0,221,41,252,141,0,221,96
1000 DATA 169,63,133,253,169,255,133,254
,169,64,133,251,169,31,133,252,162,0
1010 DATA 169,0,129,253,165,253,208,2,19
8,254,198,253,165,251,208,2,198,252,198
1020 DATA 251,208,234,165,252,208,230,32
,98,128,32,157,128,96
1030 DATA 169,231,133,253,169,199,133,25
4,169,232
1040 DATA 133,251,169,3,133,252,162,0,17
3,253,159,10,10,10,10,13,254,159,141
1050 DATA 253,159,173,253,159,129,253,16
5,253,208,2,198,254,198,253,165,251,208
1060 DATA 2,198,252,198,251,208,233,165,
252,208,229,96,169,231,133,253,169
1070 DATA 219,133,254,169,232,133,251,16
9,3,133,252,162,0,173,255,159
1080 DATA 129,253,165,253,208,2,198,254,
198,253,165,251,208,2,198,252,198,251
1090 DATA 208,233,165,252,208,229,96
1100 DATA 173,17,208,41,223,141,17,208,1
73,22,208,41,239,141,22,208
1110 DATA 173,24,208,41,247,9,4,141,24,2
08,173,2,221,9,3,141,2,221
1120 DATA 173,0,221,41,252,9,3,141,0,221
,96
1130 DATA 173,14,220,41,254,141,14,220,1
73,250,159,240,23,170,165,251,41,3,73
1140 DATA 255,56,105,3,168,208,4,138,24,
144,6,138,10,10,136,208,251,141,251,159
1150 DATA 169,0,133,254,133,252,165,251,
41,252,10,144,2,230,252,133,251,165,253
1160 DATA 41,7,141,252,159,165,253,41,24
8,10,38,254,10,38,254,10,38
1170 DATA 254,170,164,254,10,38,254,10,3
```

Figure two shows that we use three areas of HIRAM. The main one is the character memory. That is where the bit-map is stored. The term character memory is confusing, since it is derived for the function of this area during the normal CBM text mode. We retain the term, to be consistent with Commodore terminology. Each byte of the bit-map holds the colours for four pixels – figure three. Since each byte consists of eight bits, we have two bits for each pixel. Each bit of a pair may be off (=0) or on (=1). That gives us four possible settings, 00, 01, 10 and 11, which are the binary values of the four colours, 0, 1, 2 and 3. The 8,000 bytes of this area hold the bit-map for the 32,000 pixels – 160 x 200 – of the graphics screen.

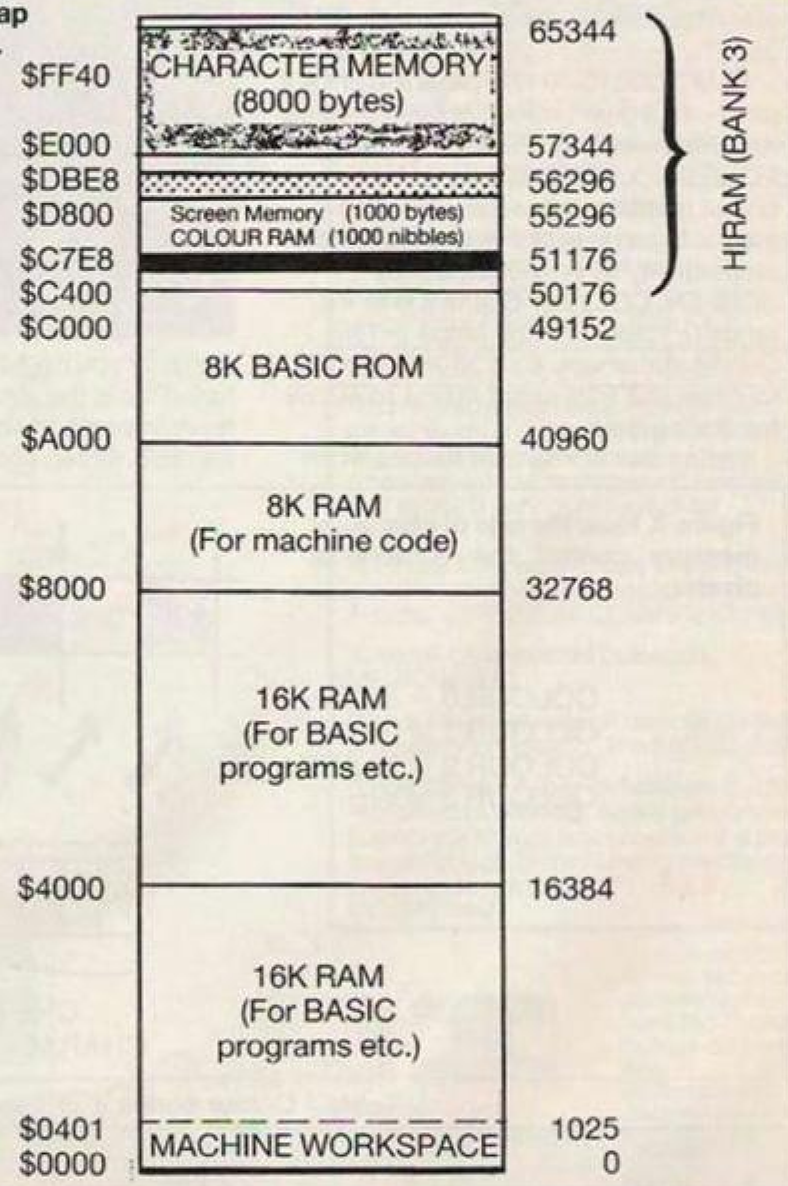
The screen memory, another confusing term, consists of 1,000 bytes, each byte corresponding to a character block – figure one. The data in screen memory sets two of the colours – 1 and 2 – for each block. Since the screen is 40 characters wide and 25 deep, screen memory requires 1,000 bytes. Each byte stores two colours, colour 1 in the upper four bits – upper nibble – and colour 2 in the lower nibble.

The color RAM – more sensible term, odd spelling – stores colour 3 for each character block. The locations of color RAM are not able to store full 8-bit bytes. They hold only 4-bit nibbles, which is adequate for storing colour numbers up to 15 but only numbers up to 7 may be used.

The only other memory location used for storing colour data is that at 53281. It stores colour 0, the screen background colour. Listing one provides all you need to get started with the multi-colour bit-map mode. The DATA statements contain the machine code for six routines. When you run the program, the code is read into the part of memory set aside for machine code. Take extreme care when typing-in the DATA statements, as a single error makes a routine unworkable. The routines provided, and the addresses they occupy, are:

SETUP (32768-32814). Reserves memory for machine code; turns on multi-colour bit-map mode; points the VIC-II chip to screen memory and

Figure 2. Memory map for graphics system.



character memory in HIRAM. The calling statement is SYS 32768.

SCREEN (32815 to 32865). Clears the graphics screen – character memory – to colour 0; sets the screen memory and colour memory to colours 1 to 3. This gives a standard four colour display. If you wish, you can later POKE various locations in the screen memory and colour memory to obtain other colours in various character blocks. Before calling: POKE 53281,col0: POKE 40957,col1: POKE 40958,col2: POKE 40959,col3. col0 – col3 are chosen from the Commodore colour codes – table one. Calling statement: SYS 32815.

COL12 (32866-32920) sets the screen memory to colours 1 and 2. SCREEN calls this routine automatically. Before calling: POKE 40957,col1: POKE 40958,col2. Calling statement: SYS 32866.

COL3 (32925-32970) sets the colour memory to colours 3. SCREEN calls this routine automatically. Before calling: POKE 40959,col3. Calling statement: SYS 32925.

RESET (32971-33015) reverses the effect of SETUP, except that memory space about $8000 is still reserved for machine code. Calling statement: SYS 32971.

PLOT (33016-33172) plots a point – a pixel – of a given colour at co-ordinates x,y. Before calling: POKE 40954,col: POKE 251,x:POKE 253,y. col is the colour number. It has the value 0 to 3, producing a pixel of colour col0 to col3 respectively as previously set by SCREEN, COL12 or COL3. x is in the range 0-159: y is in the range 0-199. Calling statement: SYS 33016. The routines use addresses 40954 to 40959 for storing data.

Listing one is intended for use when trying the routines. After storing the machine code – lines 20-30 – it calls RESET – line 40 – to configure the computer to multi-coloured bit-map mode. The next part of the listing – lines 50-900 – contains the graphics routines. Having POKEd the colour codes, we call SCREEN to clear the screen and set up the colours – lines 60-70. Then follows the graphics program, represented here by a very simple line-drawing loop – lines 80-100.

Stand on your head

After a pause to see the line, the program calls RESET – line 910 – and restores the text colours. That takes you back to text mode, to substitute another graphics routine line, or lines. You could try to plot the rather hackneyed sine



curve, or you might try the curve of listing two. This is the algorithm for a rather more interesting shape, called a cardioid. When you have seen it, you will know why it has that name – hint, stand on your head. Try varying the parameters to alter its shape. For astrophoid alter the equation for R to R=50*(1−cos(a)−2*cos(A)). Give this time to run. Try the effect of altering its parameters.

Those who want to use these routines

```
8,254,133,253,138,24,101,
253
1180 DATA 133,253,152,101,
254,133,254,24,165,253,101
,251,133,253,165,254
1190 DATA 101,252,133,254,
24,173,252,159,101,253,133
,253,169,224,101,254,133
1200 DATA 254,160,0,165,1,
41,253,133,1,177,253,170,
165,1,9,2,133,1,138
1210 DATA 13,251,159,145,
253,173,14,220,9,1,141,14,
220,96
```

in games programming should begin with lines 30 to 40 of listing one. After that, SCREEN, COL12, and COL3 and PLOT are the routines you will need.

If you want to change colours 1 to 3 for parts of the screen, it can be done using Basic subroutines. They POKE values directly into memory. The equation for calculating the address corresponding to a given character location is:

address = base + 40*row + column

Rows are numbered 0 to 24, top to bottom. Columns are numbered from 0 to 39, left to right. For colours 1 and 2, the base address is 50176. For colour 3 it is 55296. The value to be POKEd for colours 1 and 2 is:

16*col1 + col2

where col1 and col2 are colour codes in the range 0-7. For colour 3, POKE its colour code.

For example, to set the colours of the character block at column 6, row 13, to (1) red, (2) blue, and (3) yellow, the vlaue for colours 1 and 2 is 16*2+6 = 38. The address is 50176+40*13+6=50702. The statement required is POKE 50702,38. For colour 3 the statement is POKE 55822,7.

The routines are not limited to simple experiments in colour graphics. You could insert a complete game program between lines 50 and 900, should you be so ambitious. The straightforward PLOT routine, called from a Basic program, is the essential requirement. It would make things easier to have machine code routines to DRAW lines from one point to another. A routine to FILL outlines with solid blocks of colour would make the graphics more striking. We intend to provide such additional routines from time to time during the next few months.

Figure 3. How the bits of character memory control the colours of pixels.

COLOUR 0 = BLUE
COLOUR 1 = RED
COLOUR 2 = BLACK
COLOUR 3 = WHITE

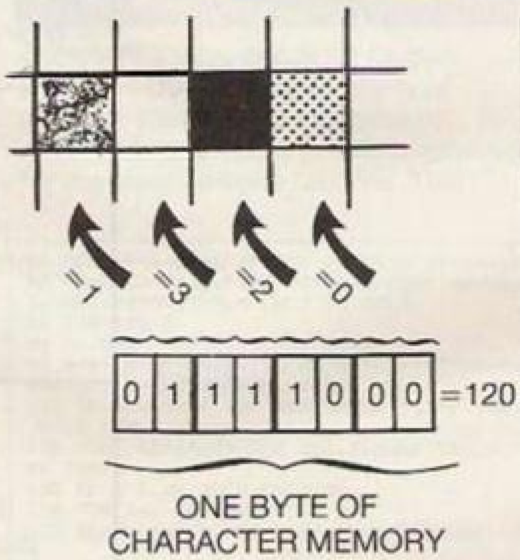


Table 1 Colour codes

0 = black	1 = White	2 = Red	3 = Cyan
4 = Purple	5 = Green	6 = Blue	7 = Yellow

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Broadly, the offerings fall into two categories – games and simulations. One of the first of the former was *Pole Position*, an adaptation of the arcade classic. You zip around a circuit. There are two gears, accelerate, brake, steer left and right. The track is divided into two lanes and opposition cars amble down one or the other or, if you are unlucky, both.

Once you have ascertained that there is just sufficient room to squeeze between two cars, it is possible to rack up massive scores. There is only one place on the track where the player must brake hard to avoid spinning off the track. The game is a classic because of the number of tricks you can learn, like overtaking on the grass and using the verges to rub off excess speed in an emergency. The Atari and Commodore versions are good but the Spectrum version is somewhat of a disappointment.

Spectrum owners have their own race games. *Chequered Flag* was a good attempt at a race game. It had plenty of gears, still only one race track, but it had a new motion – two degrees of steering so you could either steer lightly or steer hard. The difficulty is that it meant there was a huge number of keys – just too many. So the game eventually faded somewhat into obscurity.

Perhaps better remembered on the Spectrum is *Full Throttle*. Originally from Micromega, it was revived recently on the Classics label from Elite. It is a far simpler game – back to left/right steering and no gears. There was a choice of circuits and the simple object of the game is to steer past the opposition bikes and just keep the throttle open and go like the clappers.

Tough opposition

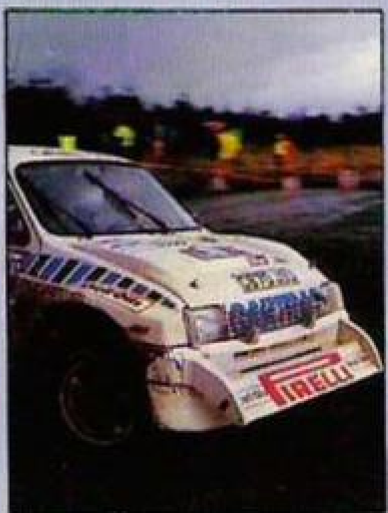
Another in this line of simple games which are good fun but hardly realistic is *Speed King*. It appeared on the Commodore from Digital Integration and then Mastertronic took it over, re-released the Commodore version and provided Amstrad and Spectrum versions. The Commodore version is head and shoulders above the rest.

The opposition is tough. There are plenty of circuits from which to choose. With five gears there is plenty to think about. There is a field of 15 other drivers and they are tricky guys to pass. They will happily carve you up on the bends. Bashing into one of them is the best way to finish last and there is plenty of scope for tactics as, once again, the old ploys like a quick spot of overtaking on the grass come into play. Once in the lead, though, things are plain sailing unless you forget the odd tough bend.

The Amstrad version had really hideous graphics. That disguised the fact that there was still a good game beneath it all but I am sure few people persevered with the nasty flickery graphics long enough to discover the fact.

The Spectrum graphics suffered from the same minimalist approach to graphics but also gained a two-player mode. Two people at once could thrill to the awesome flickery graphics with a split-screen format. The trouble was that all the other bikes disappeared and the game lost what remained of its playability.

Meanwhile, at Commodore, things were going from strength to strength.



Obviously our American cousins have taken to burning rubber on their machines. Epyx, possibly the best and definitely one of the most consistent software houses, issued *Pit Stop* and followed it up with *Pit Stop 2*. They are both good little racing games which use the Commodore sound and graphics to good effect. A somewhat different side of racing was displayed in *John Petty's Stock Racing*. It is a very tough little game. There are 20 opposition cars, with different characteristics. Some just get on with the racing; others will just block your way at all times. The player has to make pit-stops whenever he runs low on fuel. The player can use turbo boost to pass particularly awkward opposition but this is rather thirsty on fuel.

Another variation on the argy bargy theme is *Scalextric* from Leisure Genius. It is available on the Commodore and will soon be around on the Spectrum. There are circuits included with the game from round the world and you can construct your own in the time-honoured Scalextric fashion. The game features a split screen view, with the player driving against another player or the computer. If the track is designed with plenty of chicanes and sharp corners it can be a good little game.

Digital skidding

Those with Amstrad computers might feel out of all this macho machine-mangling. Those with a driving ambition have limited choice. *3D Grand Prix* is one of the few efforts in this field. It has good graphics, passable sound, gears, corners and wing mirrors, but somehow the whole thing does not hang together. Skidding is somewhat digital. There you are zipping round a corner and suddenly the sound effect changes and you know you are headed for the armco.

Following the success of Pole Position, the next refugee from the arcades has received rave reviews. *Super Cycle*, once more from Epyx, is an adaptation of the arcade hit



Hang On. It is on the Commodore at the moment but Spectrum and Amstrad versions are on the way. It is short on realism but long on excitement. The bike accelerates through three gears and the track ahead is full of tight bends, obstacles, and other motor bikes. There are 12 courses, each strewn with tougher obstacles than the previous one. The idea is to get through the course in the time limit. Any time remaining is divided according to the level on which the game is being played.

Not really a rivetting scenario but the sheer speed at which everything happens is really exciting.

Saving the heavyweights until last, we reach the simulators. Foremost among them is *Revs*. It is, in my view, one of the best programs available. The Acorn version portrays a Formula Three racing car going around Silverstone. The Commodore version has several other tracks as well. The car has five gears and reverse. To start, just slip the clutch, rev the engine and then let out the clutch. From the cockpit view, the front of the car rears as the acceleration bites. Trying all the time to keep the engine revs in the power band, the player zips through the gears. The steering system takes plenty of getting used to. The left and right keys change the amount of steering lock, so if you keep pressing left, you turn the wheel more and more. Using the space bar as well amplifies the movement.

Hot opposition

A true racing car is steered by the driver selecting the lock he requires and holding it as he goes through the corner. Experienced Revs men learn to do it by using the spacebar and then, when the required turn is reached, holding down both direction keys. Then, when the direction keys are released, the steering centres.

There are all kinds of other goodies such as adjusting the angle of the wings for better handling and road-holding; real skids, which experienced drivers can get out of; and a contest mode, where several players take turns and their performances are compared by the computer; the opposition, especially on pro level, is really hot. It is about as close as a computer game can get to the real thing.



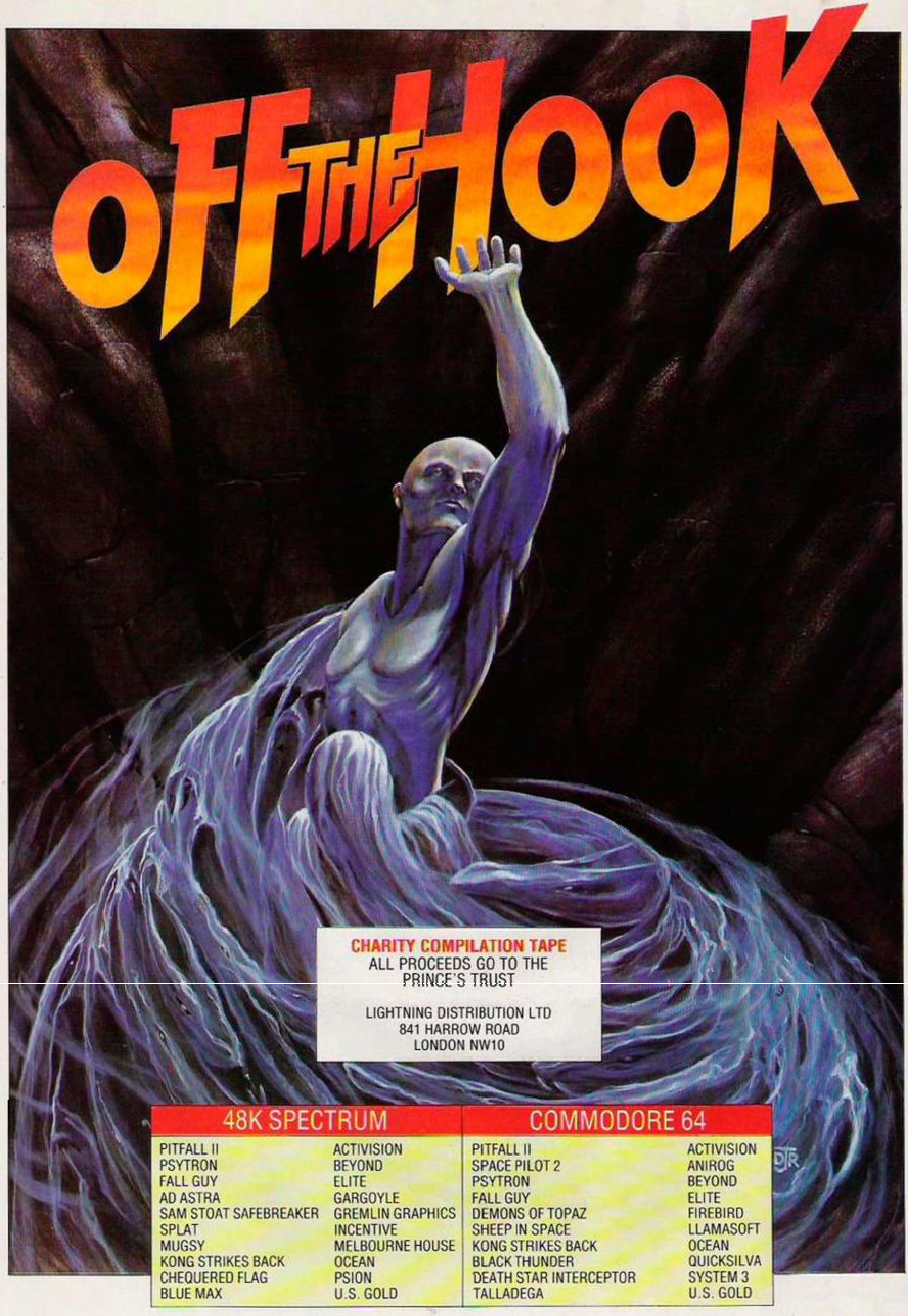
The other simulator is *TT Racer* from Digital Integration. It attempts to do for bikes what Revs does for cars and gets close. The game portrays the four classes of Grand Prix bike and takes the player through a full Grand Prix season for that particular class. The spectacular thing you notice about the game is that when you lean into corners, the screen tilts at a fairly alarming angle.

The game plays very fast, in real-time, and again seeks to



simulate the performance of the machine. Using the gears, throttle and brakes is important to keep the bike in the power band. Steering is achieved by moving the stick to lean the bike. When the bike is almost vertical, the steering is self-centring.

The performance of the bike can be altered to suit the track by altering the gear ratios, the steering and the tyre grip. A multi-player mode is included with the Spectrum, whereby up to eight players can compete using the Sinclair network supplied with Interface One. An Amstrad version is on the way but it is not clear if it will feature networking. Despite four skill levels, the game suffers from being too easy for the bike afficianado and probably too difficult for the non-initiate. Even on the highest level, there is little encouragement to corner correctly – the program just allows the player to run around the track edge. A near miss.


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CBM 03

Fruit Machine

Program type: Simulation
Author: Shaun Hewitt

A fast-scrolling screen produces a realistic simulation of the one-arm bandit machine. You are also able to nudge, shuffle and gamble all from the comfort of your home.

Haywire

Program type: Arcade/logic
Author: J. P. Lord

Faced with a grid of connections, you must swap blocks in the grid to form new routes. In doing so you must allow a small bubble car, travelling along those routes, to reach a particular destination. In the car are explosive experts on their way to defuse a bomb. If you do not reach the target in time, the bomb explodes.

CBM 04

Kung-Fu

Program type: Arcade
Author: David Chung

This martial arts program features all the aspects you would expect, such as kicks, punches and jumps. You are Lewis Lee, who has just completed his masters' examination but, unknown to you, your superiors have planned one final surprise test.

Bird of Prey

Program type: Arcade
Author: N. Sheard

You play the part of an animated golden eagle and at each stage you must collect two items of prey to feed the young in the nest. There are 20 stages to be completed before the young eventually leave the nest and, when hunting, care must be taken not to fly into trees and rocks littered about the landscape.

CBM 05

Address Book

Program type: Database
Author: Brian Hobson

This is a program for people not pretentious enough to own a Filofax or wealthy enough to own an Organiser. You can load a file of previously-saved addresses, add new addresses or printout. The program also enables you to search your files with a wild card which will allow addresses with a certain letter or number to be printed-out.

Pandomonium

Program type: Arcade adventure
Author: Peter Scott

Set in a strange land filled with springs, platforms, deadly lasers and teleport stations, you have to kill the nasty monster which reigns supreme. The only way to do it is to travel round the 75 screens collecting the various parts of a powerful bomb with which you can blast the nasty to pieces. This action-packed program also features continuous background music, 16 types of animated alien and a high-score table.

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Infocom special

Roger Garrets Adventureline

The first few weeks after Christmas are not easy for an adventure reviewer, mainly because software houses always try to release any new game for the Christmas rush, which is understandable, but it leaves January and February devoid of new material.

The only consolation for the unhappy state of events is that it allows one to write about one's special preferences and lean very much towards Infocom adventures, so this month I offer a kind of Infocom potpourri.

My first indication that such brilliant adventures existed was from reading the late lamented *Micro Adventurer.* Going through the problem page I would read such questions as "How do I cross the river?" or "How do I open the egg?" in *Zork I.* I never gave the games much thought as at that time I was busy with other games like *The Hoibbit, Twin Kingdom Valley* and the Brian Howorth *Mysterious Adventures* series, plus anything else I could lay my hands on and because the Infocom games were disc only and I had only a CBM64 without disc drive I continued to devote myself to cassette-based games.

It was not until an article appeared in MAD extolling the brilliance of these games that I decided to buy a disc drive and find for myself what all the noise was about. Little did I know that trying to buy an Infocom game in the U.K. was like trying to find gold under Wigan pier. Nobody stocked Infocom games. Finally I managed to track down two, *Starcross* and *Suspended,* so to say my initiation into the world of Infocom was somewhat mind-boggling is to say the least.

To me an adventure was an adventure. All this standard level business meant nothing to me. I had solved numerous adventures so, apart from more text why should Infocom be any different? Imagine me with a new disc drive raring to go, pen and paper in front of me, and then the magic words appearing on the screen of Starcross, an interactive fiction from Infocom, typing-in my first commands and then waiting while the disc drive whirred away.

Who cares about a slow drive, especially when I was about to solve an Infocom game? I think I was kidding myself, I can honestly say Starcross drove me bonkers. How my micro did not end up on the lawn is still a mystery. It was no ordinary adventure – it was a figment of a twisted mind sent to destroy me forever. Would I ever complete it?

Climbing Everest

After hours and hours of frustrating enjoyment I did and what an amazing feeling it is. I felt as if I had just climbed Everest and from that day I still derive the same sense of satisfaction on completing an Infocom adventure.

To understand how Infocom came into existence we must go as far back as 1960, when Digital Equipment Corporation created the PDP-10, a medium-sized computer. The 10 became popular at many research stations and a great deal of software was written for it. At the Massachusette Institute of Technology artificial intelligence laboratory an operating system called Incompatible Time-Sharing System was written for the 10. ITS was designed to make software development easy and the designers assumed that it would have a small, knowledgeable, friendly group of users, so they included no security features.

In 1970, ARPAnet was invented, which enabled interaction among virtually all computers capable of logging into the net or by knowing a certain telephone number and, because of the lack of security features, budding hackers from all parts of the country soon discovered a wonderful playground. Also around 1970 a language called Muddle – later MDL – was developed as a successor to Lisp. It never fully replaced Lisp but it developed a loyal band of followers, including the Dynamic Modelling Group. DM was responsible for some famous games – only in the States – among which was a maze game in which various players wandered round a maze shooting each other.

Each user's screen showed the view of the maze which his computerised alter-ego saw updated in real-time. One of the chief developers of the game was Dave Lebling. Another well-played/hacked game was *Trivia,* which was written – second version – by Marc Blank.



Doing it better

In 1977 *Adventure* swept the ARPAnet. Willie Crowther was the original author but Don Woods expanded the game and released it on an unsuspecting network. When Adventure arrived at MIT the reaction was typical. Everyone spent a good deal of time doing nothing except trying to

solve the game. It is estimated that Adventure set the entire computer industry back two weeks. Naturally the true lunatics began to think of how they could do it better. One was Bruce Daniels, who was the first person to get the last point, even though he had to examine the game with a machine language debugger as there was no other way to do it.

By that time another hacker had joined forces with Lebling and company, Tim Anderson, and after Lebling had devised and written a command parser, Anderson, Blank and Daniels wrote a real adventure and the early form of Zork began to take shape.

By that time Trivia was old-hat, so the multitude of hackers sat waiting for something new. Then Zork arrived on the network and people went bananas over it. Extras were added to the game in the next few months. Lebling invented the now famous *Grues* and Daniels infested the early Zork with them.



The first major change addition was in June, 1977. It was the river section devised and implemented by Blank and remains unchanged to this day. Further problems and locations were added on such as the volcano and mine sections.



More scenarios and problems were added until the game as we know it was finished. Until then nobody had thought of it being a commercial proposition. The programmers were content with what they thought was just a hobby until 1979.

Zork was one great big computer game, about one megabyte in size – as large as it could be and still fit in its original home, a DECsystem-10. Blank and Lebling designed and wrote the program with the help of Daniels and Anderson. All four had worked together in the research dept of MIT along with other computer buffs but the team was slowly disappearing into the real world. That created a problem. What could the group work on together and to whom could they sell it?

Discussions had been going on from 1976 about the potential of the minicomputer market from a hardware and software point of view. The group was ignoring the vast potential of the micro market, not only from lack of experience but also from a serious concern about software piracy.

Chinese meetings

Enter Joel Berez. He had graduated from MIT and was working in his family business in Pittsburgh. Blank had also taken a medical residency in Pittsburgh and so naturally the two got together for various outings, where invariably the talk would turn to the good old days at MIT. One reason for the good old days was Zork. The idea of taking Zork to more people evolved from their weekly meetings in the local Chinese restaurant. More people were buying micros, like the TRS-Model 1 or the Apple II, but those computers were too small to run Zork – or were they?

In those days when PCs ran to about 16K there was no way Zork would fit unless some form of specially-written program was written. Finally they concluded that, by inventing a programming system specifically for Zork, they could fit about half of it into a computer with 32K and one floppy disc drive.

Meanwhile, the group at MIT was forming a corporation, choosing Infocom as the name least offensive to everyone, and searching for a product to start generating income for the company. There were ideas such as systems for keeping track of documents, handling electronic correspondence and processing text but, until Berez added Zork to the list, nobody gave adventures a second thought.

Z-machine code

There was still the problem of compressing the text. Berez and Blank worked that out to create the programming tools for their design and by the late autumn of 1977 had succeeded in creating the Z-machine chip. The breakthrough had happened.

The key to their design was an imaginary chip called the Z-machine. The chip would be able to run Zork, or at least part of it, if the program was coded in a special, very compact language. The design also called for each personal computer to have a program to interpret the special Z-machine language and make the computer act in the same way a real Z-machine computer would.

It involved creating another language called ZIL – Zork Implementation Language. Blank built a two-stage translator program to translate a ZIL program into the Z-machine language. He also built a ZIP – Z-Machine Interpreter Program – so that a DECsystem 20 could emulate the Z-machine.

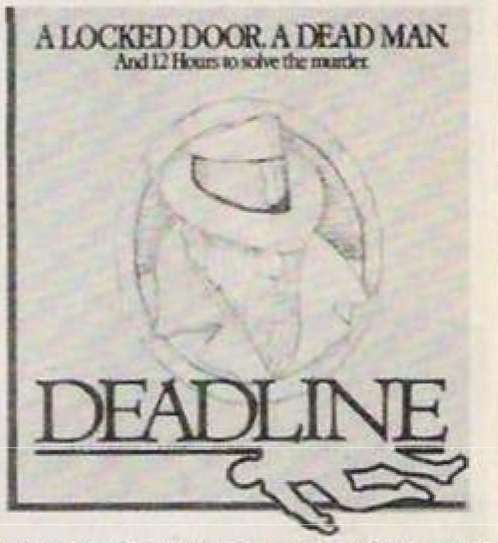
The other problem was to cut Zork in half. Lebling examined his overall map of the Zork kingdom and, eventually, by drawing certain boundaries, found about 100 locations which included the above-ground scenario and the numerous locations around the round room. The rest would be saved for another day.

After numerous problems of copyright and distribution, Zork 1 hit the streets. The rest is history.

In some of the numerous letters I receive from fellow adventurers one question seems to be asked more often than most, apart from the questions about games, and that is what is my favourite Infocom adventure? Each adventure has always delighted me because each game contains certain novel characters which leave a warm feeling.

Turtle risked all

For instance, who has played *Planetfall* and not been drawn towards Floyd, that silly little robot whose one aim was to please you? I will bet many of you said "Oh" when he died, only to smile when he returns at the end. Remember the mailbox in *Wishbringer* who bravely gave his life in your defence, or the Turtle from *Enchanter*, who risked all to fetch the scroll back for you and how many times have we muttered "Oh no, not him again"



when, on nearly completing a task, the Wizard of Froboz rears his head and casts a spell on you?

So making a choice from the Infocom range is difficult but I have made two choices. The first is also the first in the Enchanter series. Called Enchanter, it introduced spell-casting into adventures, originally to be released as *Zork IIII*, but because of the difference in character you play, a new trilogy was planned and called the Enchanter trilogy. *Sorceror* followed not long after with the final part,



Spellbraker, entering our lives in the summer of 1986.

Enchanter produced a change in the type of character we were used to playing – the greedy adventurer whose sole intent was to collect as many treasures as possible, killing or maiming anybody or anything standing in our path. In this game



the only protection we had was our trusty spellbook. Enchanter introduced fans to new words like Rezrov, Gnusto, Gaspar and other equally bizarre names but, more important, spell-casting added a new dimension to the adventure. It seemed as if the game had a mind of its own and, once having started, you were instantly enmeshed in the subtle gameplay.

Enchanter

The land of the Enchanters is a peaceful, pleasant place to live, looked after by the wise Wizards who rule with wisdom and



compassion. The Great Underground Empire is now only a memory. The splendour created by Lord Dimwit Flathead has disappeared slowly into the mists of time. Only ruins now stand where once mighty Aqueducts and magnificent palaces stood.

Peace reigned until one day when from the mysterious forbidden lands of the freezing north an evil sorceror called krill went to dwell in an old deserted castle not far from Froboz. News of Krill and his unholy sacrificial rites soon reached the ears of the Enchanters' Guild. Various members were sent to defeat Krill but his magic was so powerful that none of the Enchanters could defeat him. It would appear that Krill could read minds and if there was the slightest threat an invisible barrier would surround the castle.

The Enchanters thought long and hard about the problem until Belboz, and Chief Enchanter, had an idea so simple that Brains – reputedly the brainiest of the Enchanters – cut off his beard, left the guild and took up yak farming for not having thought of the idea. Rumour has it he is still there to this day.

Belboz's idea was to send a novice Enchanter to defeat Krill because, to put it in Belboz's words, "Anybody with the brains of a drelb, later to be known as a Dodo, should be able to approach the castle without posing a threat to Krill." With those words of encouragement echoing in your ears you set forth on your quest.

Enchanter contains some of author Dave Lebling's most endearing charac-

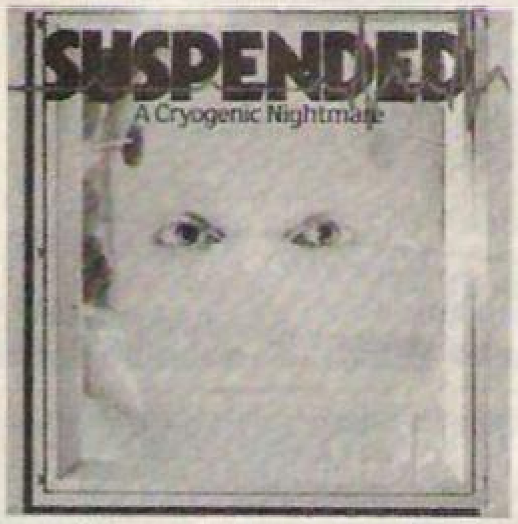


ters, such as the Turtle who, if you talk to him, will follow you round and perform a most astounding feat which, believe it or not, requires dexterity and speed – none of your common or garden type turtle in

this game. Another highlight is when you meet the lone adventurer, a true parody with his drawn eyes looking furtively this way and that, lantern held high, rusty sword dangling from tattered scabbard, some long lost treasure gripped tightly in a grimy hand, willing to do whatever you ask in return for a reward.

Before your eventual showdown with Krill, Lebling will amaze you with his masterful way of introducing problems, delight you with the text descriptions, and frustrate you at the pure logic behind the problems.

My first choice was relatively easy, as Enchanter remains my favourite but making my next choice was more difficult. The Zork Trilogy stands out in my mind, as do



Planetfall and Starcross, but I feel that *Wishbringer*, written by Brian Moriarty, must take second place, mainly because of the freshness it brought into adventuring. It is not a particularly difficult adventure with relatively few locations but Moriarty's brand of humour and writing ability set it apart from the more predictable Infocom style – if you can call any work by Infocom predictable.

Taking a rather simple idea of returning a cat to its owner, Moriarty sets about weaving an intricate tale where one minute you are a normal person trying to deliver a letter and then it is tighten-your-belt time and off we go into Mariarty's fantasy world, where talking Boots tramp around the streets, poodles turn into large ferocious dogs, platypus live on their own island ruled by King Platypus and a mailbox comes alive, acts like a cat, and dies bravely defending you from another male-eating mailbox amid shouts of "Poor little devil" and "Oh what a shame, I liked him." Such is the involvement when playing the games that one feels as if one is the person involved in all the dilemmas.

Wishbringer

Life is notr very exciting for a lowly postal clerk living in the old town of Festeron. In fact, the most exciting time is watching the traffic lights change – when they are working – which is usually every third week in December. This day seems different. Not being able to understand why, you trudge to your place of employment there to be greeted by the crusty old postmaster. The Boss wants you to deliver a letter to The Olde Magick Shop on the hill just outside the town limits. As you leave the post office the Boss issues one last command – "Make sure you deliver the letter before five-'o-clock or woe betide you." That is just the kind of joyful message you need to help you on your way.

No ordinary shop

Further along the road Miss Voss entrusts you with a note for your boss while her pet poodle distrusts you and to show his distrusxt sinks a pair of needle-sharp teeth into your right ankle. After detaching said ankle from said jaws you eventually make it to the Magick shop. Moriarty's skill at writing grips you instantly as you open the door and walk inside, because this is no ordinary shop.

INFOCOM HINTS

ZORK I

Wave the Sceptre at the Falls.
Pray at the Altar with the Coffin.

ZORK II

A Newspaper helps fill a Balloon.
An angry Dragon will always follow you.

ZORK III

Use compassion when encountering the Hooded figure. Touch the Table to travel.

STARCROSS

To enter the spacecraft you must study the bumps and remember astronomy.

TRINITY

The Pram and Umbrella make travelling easier. Give the Origami to the little girl as a means of transport. The giant Venus Flytrap smells like Honey and what do bees like?

MOONMIST

To get rid of an unwelcome guest make sure you have the aerosol. To enter the locked gates is just a matter of seeing eye to eye with something.

WISHBRINGER

Give a dog a bone and later say "Alexis Heel". If you want to surprise a Toll Keeper give him the can., Remember the note Miss Voll gave you? Use it when in a trying situation – or is that tieing?

Scattered around are various masks, herbs and other brick-a-bat but what hits you most is the claustrophobic atmosphere which prevails. After delivering the letter you turn to leave when suddenly you lose all sense of time and reason. The next thing you remember is awakening outside the shop with the words "find my cat" ringing in your mind and that is when your heartaches begin.

An evil transformation

Everything has changed. What was once a boring little town is now an evil place. Nightly patrols by the Boot Patrol are to be avoided at all cost but if you have done an act of kindness being thrown into the briny by the boot patrol is not too bad. As in all Infocom games there are plenty of problems to overcome before the conclusion, such as rescuing a princess, getting past a ferocious dog, escaping from the cells, plus other assorted brain-teasers, but one thing for sure is that you will enjoy yourself immensely before it is over.

All the Infocom adventures are now being released by Activision, which bought Infocom last summer, and are available for the CBM64/128/Amiga,



AtariXL/XT/ST, Amstrad CPC and Apple.

The latest, *Hollywood Hijinx*, was scheduled for February release. Written by Dave Anderson it is a kind of spoof about the good old Hollywood 'B' movies. Set inside an old-style Malibu movie producer's home, your task is to find 10 treasures a la Zork. Only then can you inherit this vast estate. The catch is you must find all the treasures in one night or lose everything.

To add to the fun the character you control is a special effects creature from a Buddy Burbank sci-fi film . The package contains a gossip-filled Tinselworld magazine, an autographed photo of your Uncle Buddy, a letter from Aunt Hidegarde and a lucky palm tree swizzle stick. It sounds like just the thing to occupy a few pleasant hours.

COMPUTERS IN CONTROL

The home of the future is likely to feature a central computer in control of all aspects of its electrical equipment – everything from heating to lighting and possibly including the kitchen sink. Peter Luke gazes into the future.

In the not-too-distant future, a householder shopping for a washing machine will be asking not only the usual questions regarding maximum spin speed and load but whether or not the machine features an RS232 or Centronics interface. Electrical equipment throughout a home will be linked to a central computer which will be responsible for controlling and monitoring all the functions of the units. The potential benefits in terms of convenience, economy and increased security will mean that the investment in such systems will soon pay for itself.

The technology for implementing such a home control system is with us today. Most modern household appliances, from washing machines to cookers, feature at their heart a microprocessor responsible for controlling the operation of the unit. Other equipment such as video recorders and hi-fi systems have for some years featured one, occasionally two, MPUs as part of their control systems.

If Alan Sugar is to be believed, it will not be long before even the humble domestic refrigerator will feature a microprocessor to optimise its performance and perhaps speak to its owner. It does not require too much imagination to realise that were those various items of equipment linked to a central control system which could co-ordinate their activities, there would be considerable benefits for the home owner of the future.

The major difficulty in linking various items of equipment scattered throughout a home concerns the way in which data will be exchanged between the appliances and the central computer. The problem concerns both the physical connection of the two units and the protocols which would govern the form in which the data is exchanged.

On the subject of the physical – wire – link between units, householders would be reluctant to install a jungle of wires connecting the various units to be controlled. Not only would that look unattractive but it would probably be unreliable in operation.

Fortunately, though you may not realise it, every house in the country already has a data distribution system in the form of the ring main which carries power throughout the home. By using a special interface it is possible to superimpose data signals on to the 240V AC mains supply. One such system was described in the November issue of *Your Computer*. That was the Red Boxes home control system which features a central control unit, quaintly named Red Leader, which may be programmed by a home computer.

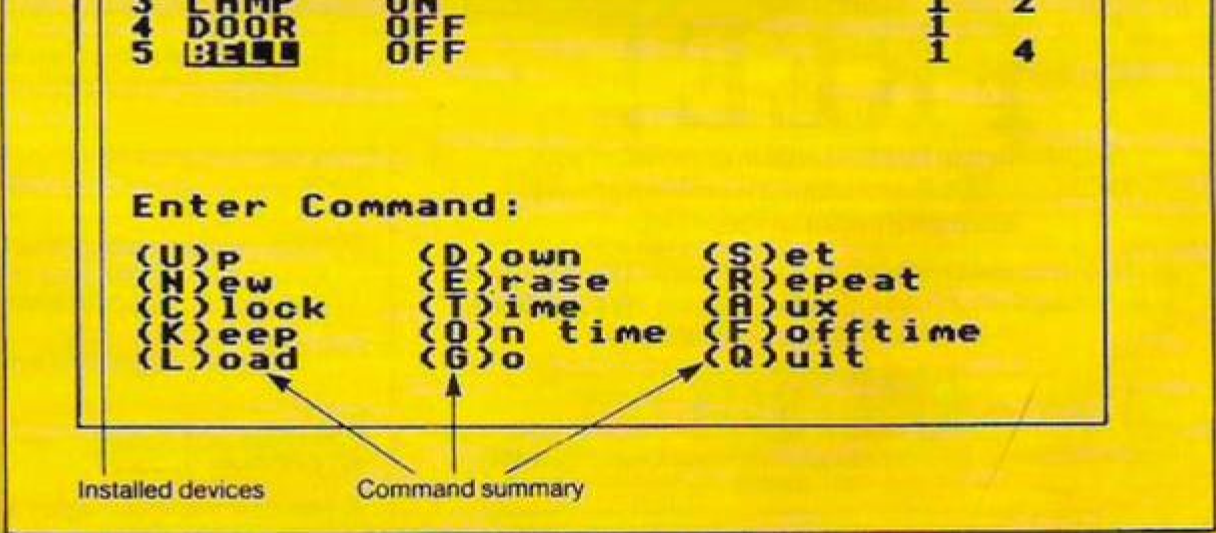
That unit may then issue command signals to units scattered throughout the home. Those units react to the control signal superimposed on the mains voltage which powers them. The units are plugged into standard mains sockets and any appliance to be controlled is, in turn, plugged into the slave unit. The unit incorporates an electronic on/off switch which reacts to the mains-borne signals transmitted by the central control computer.

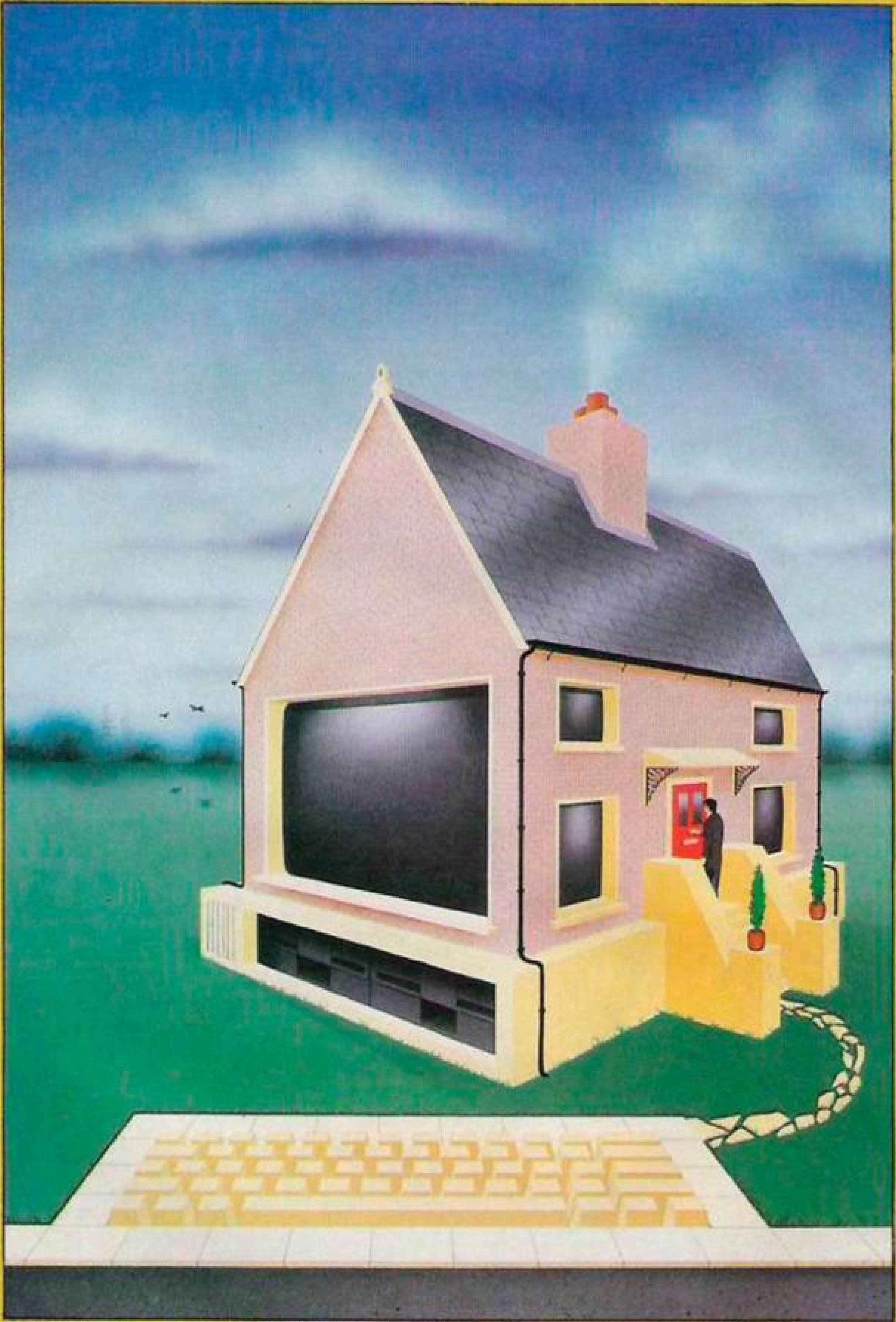
Data is likely to be exchanged between the central control computer and slave units as a serial stream of data much like the RS232 standard. Exact protocols are likely to vary between manufacturers but, as the number of home control installations increases, there will almost certainly be pressure for an agreed standard form of information interchange.

Since technology of home control systems is with us, what benefits will the adoption of such systems bring to the average household? The advantages of installing an intelligent control system fall into three areas. The first is one of convenience. By locating the central control panel in, for example, the living room, it would be possible to control all the appliances in the home from a favourite armchair.

That concept is an extension of the control offered for TV

The Red Box control program can display information on up to ten devices.





and hi-fi systems by the infra-red remote control systems which have become common in recent years. With a computerised home, though, it would be possible to switch on the electric blanket in the bedroom without missing a second of News at Ten.

The second major area of benefit lies in the potential for increased security in the home. The Red Box system has as part of the starter system a passive infra-red motion detector which can alert the main control system if there is any movement in the room in which it is located. On detecting a signal indicating movement in the protected area the central unit could take one of a series of actions depending on its control program.

The actions could include sounding either an internal or external alarm bell, depending on the time of day and whether or not the house was occupied. If connected to a modem, the computer would also dial a pre-determined telephone number and play a synthesised voice message over the line. Another option would be to have the control computer switch on a floodlamp to illuminate the grounds of a house.

In addition to controlling an alarm system, the central computer could be programmed to simulate the occupation of an empty house by switching lights on and off at pre-determined times, even perhaps turning on an audio system in the early evening and off at bedtime.

Either of those options may mean that an insurance company would be prepared to lower the premiums payable on a household contents policy for the home. Savings made in this area could well mean that the cost of any security system could be recouped after only two years. In addition, the peace of mind which would result because you knew that you home was protected during absence could well make the system worthwhile.

A computer-controlled home could also mean savings in other areas, most notably by making a home more energy-efficient. By placing thermostats throughout a home and linking them to a heating system and an intelligent control program, it should be possible to make savings on the annual heating bill.

When the potential benefits of installing a home control system are weighed against the cost of such an installation, it is apparent that many forward-thinking builders will be paying particular attention to this area of computing in the next few years. The day when it will be relevant to ask about the interface potential of your refrigerator may not be too far away.

• **Your Computer** ***wishes to thank Red Box for its help in writing this feature.***

INFORMATION

PR MATTERS
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LONDON SE1 1NX

Sample pleasures

Until about a year ago there was almost no commercial software or hardware for the Spectrum owner wanting to experiment with music-making and sound manipulation. Not any more. Reporting on this change is Tony Sacks.



Cheetah sound sampler for the 128K Spectrum.

Until about a year ago there was almost no commercial software or hardware for the Spectrum owner wanting to experiment with music-making and sound manipulation. The demand for such packages was demonstrated when Cheetah Marketing unleashed its SpecDrum percussion simulator. To date more than 30,000 SpecDrums have been sold.

Cheetah is hoping to repeat this success with a new crop of musical products for the Spectrum. They include a Midi package which will allow the Spectrum to communicate with electronic musical instruments, and a five-octave musical keyboard which can be used to control either the sound chip included in recent Spectrums or Midi-equipped instruments.

Cheetah has also launched a Sound Sampler. It turns the Spectrum into a sound recorder by using the micro memory to store a digitised version of a fragment of sound. The sound can later be extracted from the memory and reconstituted into its original form.

Six-foot cable

The sampler hardware takes the form of an unassuming black box which plugs into the Spectrum user port. Two anonymous control knobs project over the Spectrum chassis – the function of one of them remains a mystery until near the end of the finely-printed instruction manual. To hear the sampler output you will need an amplifier within the six-foot reach of the audio cable which protrudes from it.

One attraction of sampler programs is that they load relatively quickly because as much memory as possible has to be reserved for storing the sampled sounds. Another result of this requirement is that the programs tend to be graphically rather stark. The Cheetah sampler is no exception, loading in less then

three minutes – or even quicker if you take up the option of transferring the program to Microdrive – to present you with a bland five-option main menu.

You will probably head straight for the sampling option which takes you to a sub-menu offering a choice of six alternatives. One of these produces a slightly-delayed oscilloscope effect so that, as you talk or sing into the microphone supplied with the sampler, the sound waves are displayed on the screen. This display allows you to adjust the first of the mystery knobs to set the sampler sensitivity. If you are overloading the input, the sound will distort, with obvious effect on the oscilloscope trace. On the review model, the sensitivity knob had very little effect for most of its rotation but small adjustments near the end of its travel could make a large difference to the sensitivity.

Devoted units

Cheetah divides its sampler memory into 116 units, each about 1/144 second long. If my arithmetic is correct, this means that the longest sample possible at the normal sampling speed lasts just less than a second. Several shorter samples can be stored at the same time and, before recording a sample, you are asked how many units you want to devote to the sound. This can be difficult to estimate, unless you are used to thinking in terms of 1/144th of a second. If you allow too few units your sample could be cut off in its prime, while too many units would waste precious memory.

If you are privileged enough to own a 128K Spectrum, you can use the extra memory to store up to 256 extra units of sound in four banks. The maximum length of any one sample, however, is not increased.

Before you record a sample you have to give it a name and decide whether you want to record it at full or half-speed. In the latter case, your sample will last twice as long but the quality of the replayed sample is noticeably reduced.

You are now ready to record your sample, either when the program tells you to or, if your prefer, when you hit the space bar.

Dubious tuning

The quickest way to listen to the results is to use an option which lists all the samples in memory, replaying each of them as its name appears on the screen. A few more keystrokes will take you to a section where you can play back the sample at different pitches in a two-octave range using two rows of the Spectrum QWERTY keyboard transformed into a makeshift piano keyboard. The tuning of some of the notes is dubious.

To take the rough edges off your sample or to alter its character you head for the edit menu. There you can reverse the sample, produce a copy of it or combine it with a second sample to produce a more complex sound. More important, you can also configure the sample by chopping unwanted bits at either end and by defining a central section to be repeated or looped several times to extend the sound.

Looping

Looping is done by placing markers on displays of the soundwaves stored in each of the units of sample memory. You place the markers where you feel the replayed sample should start and finish and where you would like it to be looped, if at all. Unfortunately there is no single display of the complete sample to give you an overall idea of how it varies with time. Instead you have to step through each of the units in the sample with the screen being re-drawn each time. This can be a laborious process if you have a single sample taking up all 116 units of memory. Stepping sequentially from one end of such a sample to the other can take almost a minute.

There is an option of going directly to a particular unit by selecting its chronological position but as this number is not displayed on the screen, finding a specific unit is a hit-and-miss affair.

Once you have configured your sample, you can return to the musical keyboard section and the looped section of the sample will play repeatedly until a key is released. If you are lucky this can give an impression of a note lasting much longer than the original sample but the chances of the repeat points merging smoothly with each other are small.

Sample files

On the second side of the program cassette, Cheetah has stored six sample files to give you an idea of what can be achieved with the sampler.

Also lurking on the cassette – but not made clear in the manual – is a second program which turns the sampler into a real-time effects processor. This offers half-a-dozen ways of transforming any sound fed into the sampler.

They include an echo chamber, a reverb, a pitch shifter to give Donald Duck effects, a fuzz box which produces a distorted version of the input sound, a sound chopper for Dalek-type effects, and an intriguing bubbleiser which performs indescribable mutations on your original sound. The role of the second control knob is now revealed as controlling feedback levels for the echo and reverb effects.

Fun to play with

The effects program is more than a mere gimmicky afterthought to the sampling program. It produces some attractive and musically useful variations on the input and is also fun to play with.

Indeed, many musicians would probably find the effects section more useful than the sampler. Despite the Cheetah claim that the sampler is suitable for professional use, it is unlikely to make an appearance on Top of the Pops. The sound quality is not high enough and, equally important, the Spectrum QWERTY keyboard does not make a very convincing musical keyboard, especially as you have to use a Shift key to change octaves.

One way of avoiding this limitation would have been to include a Midi interface in the sampler as Ram Electronics does in its Music Machine package – see *Your Computer*, January 1987. Cheetah has not provided this or any other means of controlling the sampler from a conventional musical keyboard. This omission is surprising because, as mentioned previously, Cheetah is already marketing both a Midi software package and a full-size, five-octave keyboard.

Stiff competition

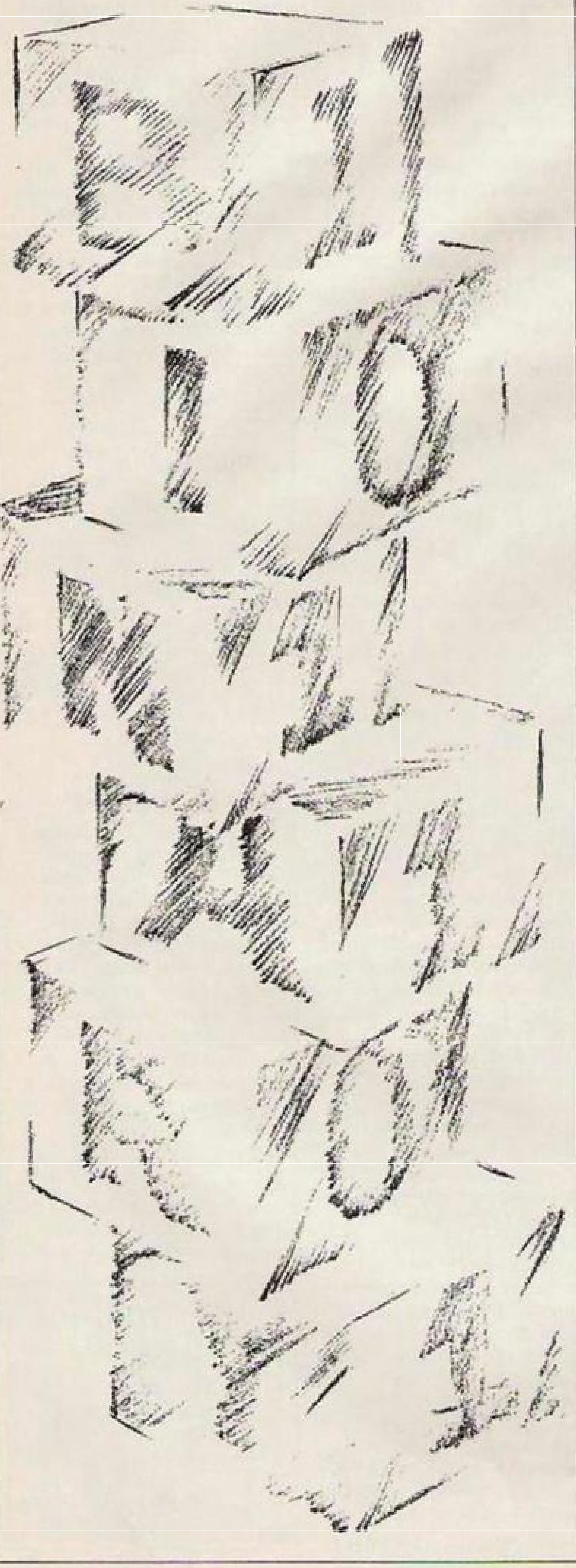
Six months ago the Cheetah Sampler would have had the market to itself. Now it has to face formidable competition from the Music Machine which, for about £5 more, offers a Midi interface, a drum machine and a simple music composing section. The Ram package also allows samples to be played back at two pitches simultaneously for greater harmonic interest.

More sophisticated

In its defence, the Cheetah Sampler produces higher-quality sounds than the Music Machine but the difference is not so great as the 17.5kHz bandwidth – compared to 9.5kHz for the Music Machine – would imply. Its sample manipulation facilities are more sophisticated and its real-time effects more versatile and convincing than those of the Music Machine package.

At £44.95, the Cheetah Sampler offers undoubted value but you may feel that the £49.95 Music Machine provides even better value.

Information
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Telephone: 0222 777337



Understanding a

Anyone interested in machine code should learn about assemblers. Ian Duerden explains why.

The world of machine code has inherent advantages of speed and controlability. Its major disadvantage is its complexity but by using assembly language much of that can be overcome. The computer you use arrives complete with a Basic interpreter which converts Basic programs into a form the machine can understand. To write in assembly language you will need to buy an assembler/disassembler package. There are many on the market for all types of machine, ranging from a few pounds for simple versions and up to £50 for ROM-based ones.

Checking

The first part of any good assembler package is the Editor. As you can appreciate from its name it provides you with the opportunity to type-in your assembly listing and make any corrections or modifications necessary. It is vital, if you type-in and run any Basic program, that errors are spotted and the machine will stop, give you details of the fault and let you correct it.

In machine code that is not possible; any attempt to run a faulty program generally will result in the machine locking-up with no indication of where the fault lies. The Editor therefore allows you to check your program or listing fully but that is not the only safety device. After saving any data, the second part of the package, the assembler, goes into operation. It converts your assembly code into binary, the language the machine understands. If you have made a serious error or the assembler cannot understand any of your code it will stop assembling to give you a printout or on-screen display of the error or errors it has found. You can then return to the Editor to correct the errors before attempting to re-assemble.

When the program/listing has been assembled it can be saved to tape or disc and run with either a small Basic program, added to a subroutine of programs, or added to other programs to make a much larger and more complex one.

Monitor aid

An incidental advantage of the Editor part of the package is that it can be used as a mini word processor; most of the usual word processing commands are found on the better assembler/ disassembler packages so it is possible to write all your letters using this method.

You have probably noticed that the assembler package is described as an assembler/ disassembler, so what is a disassembler? Most packages call the disassembler part of the package a monitor, which gives you a much better description of the use to which it is put.

Even when you have assembled and saved your work of art, it does not necessarily mean that everything is perfect and will work first time, so you need a way to run through the program – that is where the monitor assists.

Figure one shows a typical monitor screen. It is complex but once you get used to the commands and different screen areas it is relatively

assemblers

straightforward.

The monitor allows you to run your program either in steps to see what is happening or set break points at various intervals throughout the program. Many other commands can be used, such as Search for a particular address, Examine particular addresses, Copy areas of memory to another memory location, and so on.

The monitor is probably the most complex part of the program and will need a fair amount of practice. Using the monitor, it is possible to look at someone else's program and perhaps even modify it but unless you are fully-conversant with such packages it is best to leave such things alone.

What should you look for in such a package? First, much will depend on how much you are willing to spend; normally, the dearer the package the more it will do. Take, for instance, the Amstrad range of machines. There are some assembler/disassemblers for less than £10 but they tend to be extremely basic, without much of a manual. At £14 there is *The Code Machine* from Picturesque/Gremlin which is tape-based and contains probably most of the commands needed, and a reasonably concise manual. Then there are the more complex packages such as *Pyradev* from Gremlin and *Laser Genius* from Ocean which retail between £20 to £30, both on disc. The most expensive are *Maxan* on ROM – also available on tape and disc – and the Hi-Soft *Devpac 80* package, both at around £40.

It really depends on how serious you will be taking the subject. It is probably advisable to look at the manuals before you buy, as that will give you a reasonable idea of the standard of a particular package.

As well as an assembly package it is probably advisable to buy a good book on the subject. There are many on the market for all machines, so look for one written in terminology you can understand. Most books retail at around £7 to £10 but you could attempt to get them from your local library initially and then buy one later.

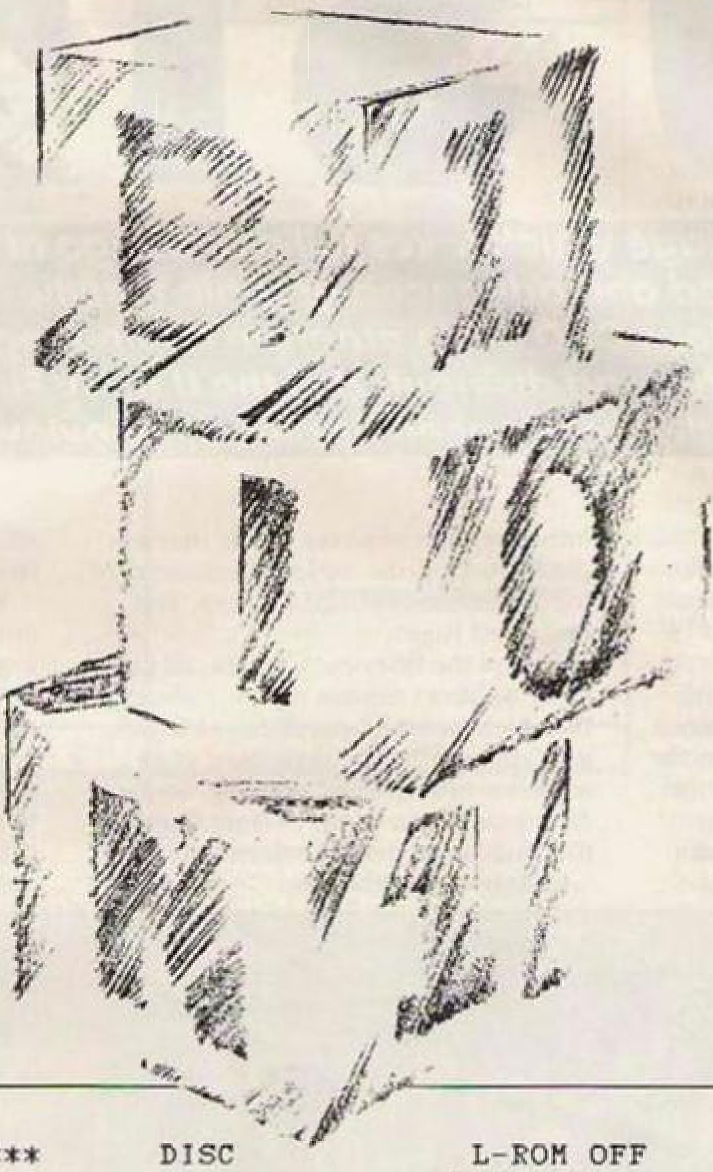


Figure 1.

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 *** AMSTRAD MONITOR ***      DISC           L-ROM OFF              U-ROM 255 OFF
                                             8000 6A          LD    L,D
 T 1                                         8001 CB 4E       BIT   1,(HL)
 R 2                                         8003 C8          RET   Z
 A 3                                         8004 23          INC   HL
 P 4                                         8005 CB D6       SET   2,(HL)
 S 5                                         8007 CD FE 80    CALL  80FEH
   S                                         800A 78          LD    A,B
                                             800B FE D7       CP    0D7H
   A-F  B-C  D-E  H-L   IX   IY   SP   PC    800D 28 06       JR    Z,8015H
  4E0C 0001 2E0B 60F1 9164 A458 BFF8 0000    800F 3E 04       LD    A,4
  0000 0000 0000 0000 0000 0000 0000 0000    8011 30 02       JR    NC,8015H
  *FLAGS * (0000-4E00-204E-DF5E-5200)        8013 3E 06       LD    A,6
  -----P-- (0000-0003-000D-A4C9-9AB9)        8015 C3 03 81    JP    8103H
  8E8C 7F8E 1268 BB8C 0008 Alt regs & I,R    8018 CB 68       BIT   5,B

    .8000  6A CB 4E C8 23 CB D6 CD FE 80 78 FE D7 28 06 3E  jKNH£KVM~ x~W(.>
     8010  04 30 02 3E 06 C3 03 81 CB 68 28 04 1E 5C 18 37  .0.>.C..Kh(..\.7
     8020  CB 60 28 1E 54 26 61 18 22 CD 68 80 CD 3F 7E 5A  K'(.T&a."Mh M?~Z
     8030  FE 02 28 05 FE 04 DC CC 80 0C 5C CB 70 20 1F 1D  ~.(.~.\L .\Kp ..
     8040  18 32 CD 52 80 CD FC 80 C3 CC 80 CD CC 80 5A 54  .2MR M: CL ML ZT
     8050  18 01 0D CD CC 80 5A CD 68 80 0C 0D 5C C0 7C FE  ...ML ZMh ..\@:~
     8060  01 28 11 FE 05 DA 03 81 CD 3F 7E CB 7B 28 08 CB  .(.~.Z..M?~K((.K
     8070  BB 1F 18 03 78 E6 07 83 5F FE 07 28 41 FE 0A 28  ;...xf.._~.(A~.(
 CTRL-X to EXIT            Press ESC for MENU                   t PYRAMON 1.0
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3D STart

A package which takes full advantage of the Atari speed and advanced graphic facilities is the marvellous CAD 3D, a program originating from the States and distributed in the U.K. by Electric Software. Stephen Applebaum reviews it.

In the January issue of *Your Computer*, I looked at an ambitious 3D modelling package, designed for the CPC range of Amstrad computers, called *Model Universe*. Although superficially impressive, the program was ultimately ineffectual since its operation was greatly hampered by the limitations imposed on its design by the Amstrad 8-bit central processing unit.

Similar hindrances do not occur with machines such as the Atari ST, as it, unlike the CPC 464, for example, utilises the more efficient 16-bit 68000 chip. This can perform arithmetical functions at a much faster rate, which manifests itself as an increase in the speed at which programs are executed.

Computer-aided design encompasses a variety of uses. On the one hand it can help in the make-up stage of two-dimensional plans – of circuit boards, house layouts and so on; while on the other, there is the, in my opinion more exciting, field of solid modelling. *CAD 3D* is an example of the latter.

For me, the most advantageous feature of the ST is the GEM operating system. The majority of readers will be familiar with GEM and its similarity to the Macintosh operating system, insofar as it, too, is WIMPs based. Windows, pull-down menus and a mouse are the principal features of such an arrangement, making the whole supremely user-friendly.

CAD 3D makes good use of all these qualities and as a result is extremely easy to get along with. Its work area is divided into four large windows which, moving clockwise from the top left-hand corner of the display, are entitled Camera, Top, Front and Right.

Except the first one, Camera, all the other windows contain representations of the object as seen from different angles, in keeping with the conventions of an orthodox orthographic drawing. So as to distinguish these windows from Camera, they will henceforth be referred to as 'auxiliary view' windows.



The Camera view window is not like the others, because it allows the user to add perspective to an object, so producing a picture of how it would look were it a tangible body, and not a flat simulacrum on a monitor. At least that is the theory.

How this works is simple. All the windows are equipped with two slide controls running vertically and horizontally along their borders. For now I will just concentrate on those appertaining to the Camera window, as they are the more interesting. As those connected with the auxiliary view windows produce a slightly different effect, I will return to them briefly a little later.

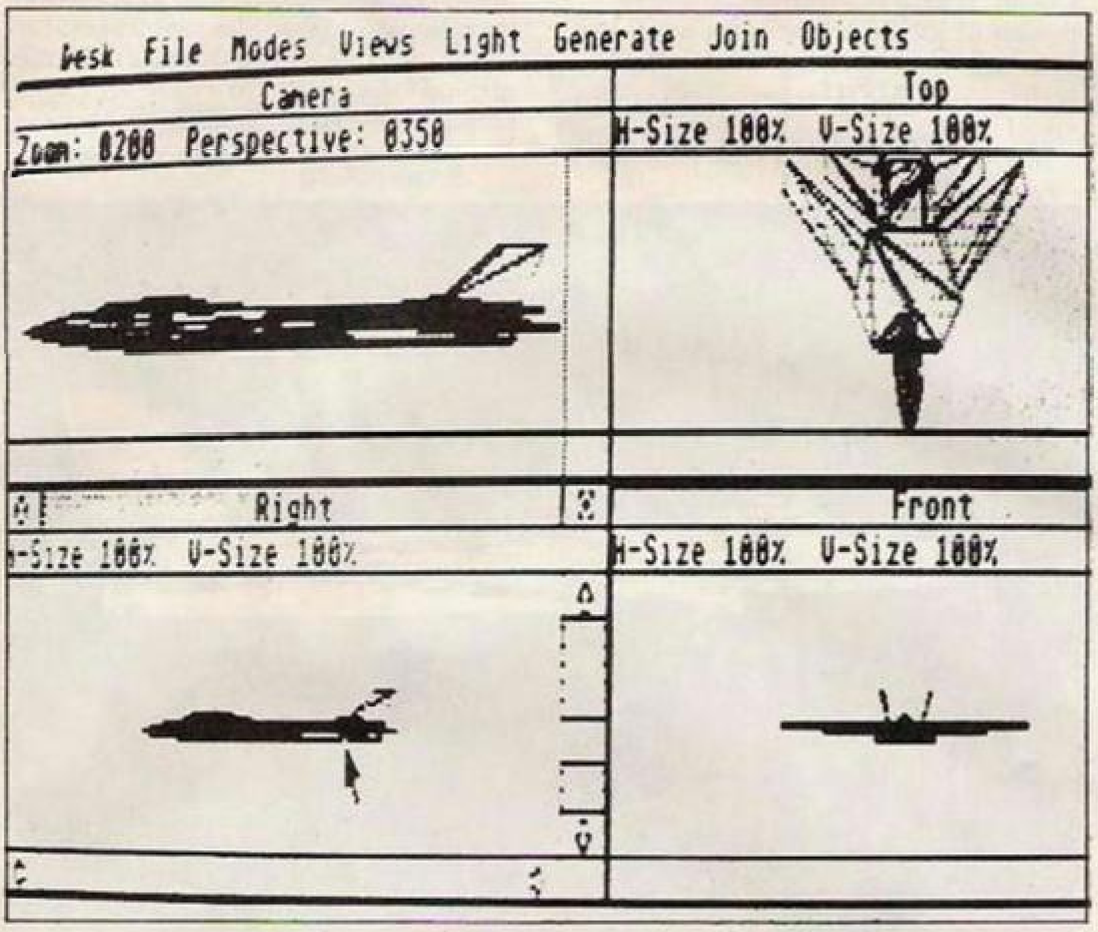
The Camera view window is distinguished from the auxiliary view windows by two modes called Rotate and Zoom/Perspective. In the former mode the two slide controls, mentioned earlier, provide the means to rotate an object in the horizontal and vertical planes. Or to be more correct, they alter the user's view point and not the displacement of the object *per se*.

To understand how changing one's viewpoint produces a different effect to moving the object, try to imagine a solid cube suspended just in front of you, at about eye level. Now, were the cube rotated vertically downwards, then the effect would be to move the top edge towards you. Conversely, if you were to lower your line of sight, completely the opposite would occur. Exactly the same is true when moving your viewpoint from left to right. Although this is fairly fundamental stuff, it can be confusing at first.

When in Zoom/Perspective mode, the functions of the Camera view window slide controls alter to accommodate these two new factors.

The horizontal bar along the bottom of the Camera view window sets the zoom factor. This can be anything between 0 to 1000, where the numbers are a measure of closeness. Selecting a high number moves your viewpoint nearer to the object on hand, so apparently increasing its size. In other words, the zoom factor is a measure of magnification.

Perspective is added via a slide control



running down the right-hand edge of the Camera view window. Again the limits are set between 0 and 1000, except this time choosing a large number does not enlarge objects but adds realism to the overall picture by making foreground objects appear larger and background ones smaller, so producing the illusion of depth or distance.

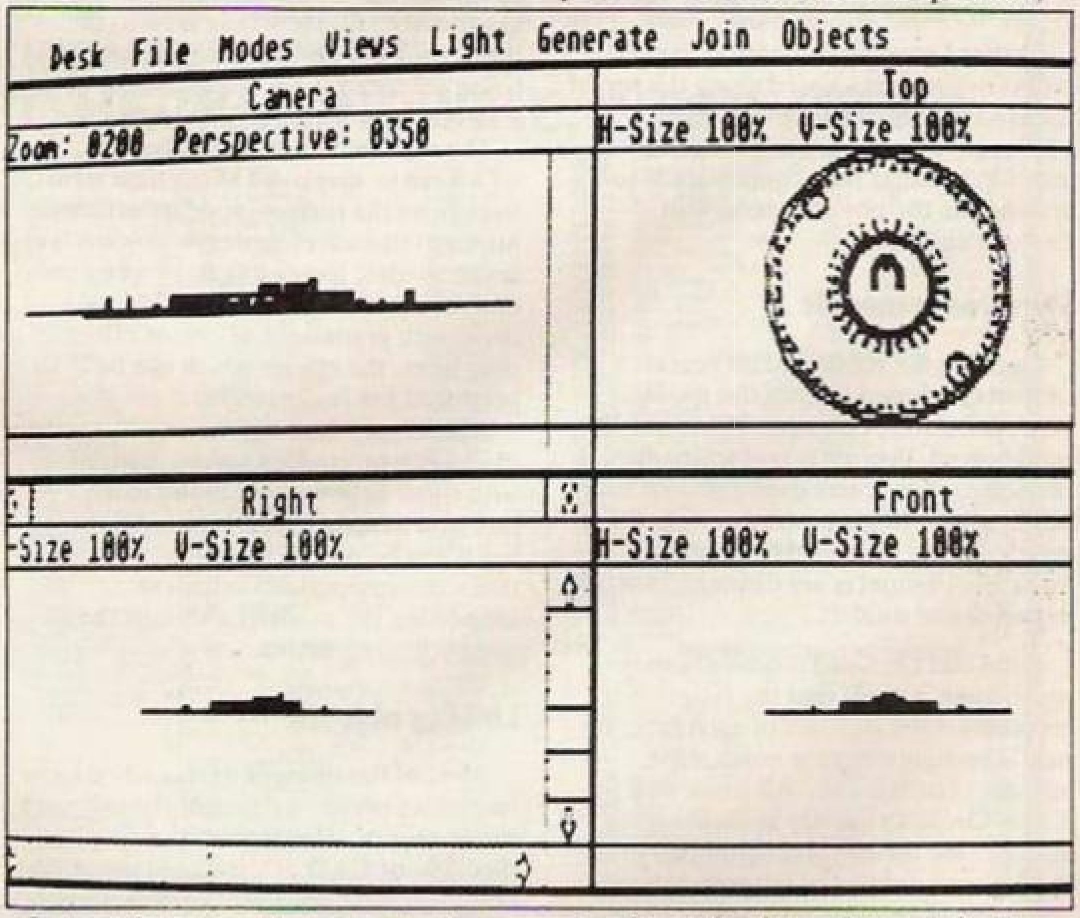
Object rotation

The three auxiliary view windows are similar to the Camera view window in the sense that they, too, have two modes. Their different functions set them apart. Instead of Rotate and Zoom/Perspective modes, the auxiliary view windows have Rotation and Scale. Even the former is not like that described earlier, because rather than the user's viewpoint moving as before, this time it is the object which is rotated. In Scale mode, individual objects can be enlarged or shrunk, though only in the plane of the slider.

So far I have restricted myself to describing the functions of CAD 3D which must be grasped before you can go ahead and start 'modelling' your own objects. Now they have been covered, I can tell you of the various design tools contained in the program.

Extrusion

Objects are formed in CAD 3D through two processes termed extrusion and spinning. The tools to perform each of these operations are found in a pull-down menu called Generate, which is just one of eight such menus located along the top of CAD 3D workscreen.



In manufacturing, the term extrusion applies to a process where metals, plastics and other malleable materials are shaped by being forced through a die of some description. Although the agency is obviously very different, the results of the CAD 3D Extrude command are not dissimilar to the effects produced by the aforementioned procedure.

Options aid

Selecting Extrude from the Generate menu changes the display from four small windows to one large one which fills the entire work area. To help users maintain symmetry in their designs, this window is cut by a vertical and a horizontal line, splitting it into four equal portions.

Another aid with a similar function is a grid which can be called-up from within a pull-down menu called Options. The grid's aim is simply to provide a guide for drawing.

Simple technique

An extruded object starts as a two-dimensional outline, the so-called template. This is drawn using a simple technique whereby dots are laid down to mark the beginning and end of a line. When two points are selected, the program draws a line between them

Which is to say, were the shape being drawn a square, then obviously, the amount of dots one would be required to indicate is four.

So far as the user is concerned, designing a template is the most important phase in the entire extrusion operation, since its outline forms the mask for the cross-section of the completed figure.

To turn the flat silhouette into a solid three-dimensional model, the template must be extruded by clicking on an item

called Do Extrude in the Options menu. After having been extruded, the result of the operation can be investigated in the Camera view window, where the new object can be rotated through almost any angle.

Lathe effect

Although spin functions very much like extrude, the objects created with it are of a very different nature. Whereas those modelling using the process just described are expanded three-dimensional versions of the template, objects formed with the spin tool finish up as 'radially symmetric' figures. An effect similar to that produced by a lathe.

Creating a template with the spin tool is almost exactly the same as already outlined, except for one major distinction: instead of drawing a complete figure as before, only one half needed to delineated on one side of the work area, because the computer mirrors every move on the other, producing a perfectly uniform copy.

Just before the figure can be spun, the number of segments which will form the finished model have to be specified by means of a slide control at the bottom of the Spin window. If the number chosen is either too high or too low, then the roundness of the final object will be seriously affected.

Earlier I gave brief mention to eight pull-down menus located along the top of the CAD 3D display. Two of them, Modes and Views, are of particular interest, because they contain tools to manipulate the objects made with Extrude and Spin.

Wireframe models

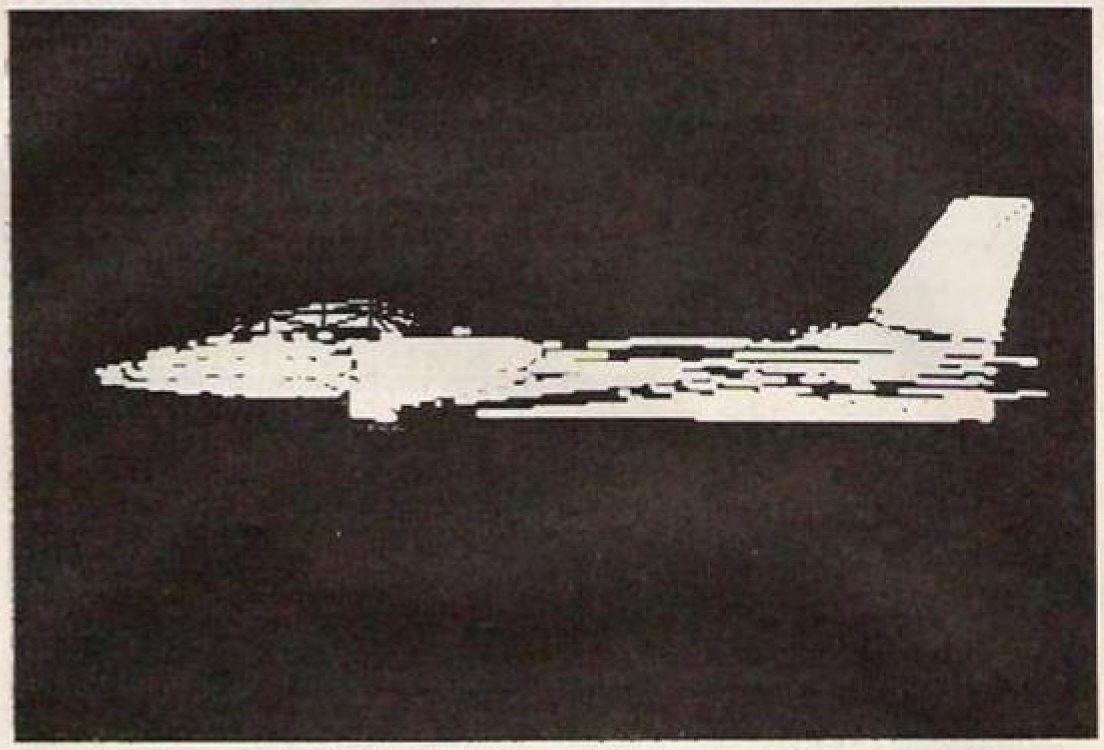
Opening the modes menu reveals a list of items designed to alter the physical representation of objects. There are six modes in all, the first two of which display objects as wire frame constructions with either all the lines showing or only those which are not obscured by another surface. All objects are displayed initially as wireframe models.

Solid and Outlined modes are very much alike, except that the latter emphasises the outlines of each face, so making a figure appear much more angular. The last two, All Lines and Edges Only, do exactly as their names suggest; the former highlights every line in an object, while the latter shows only the edges of faces on an object.

Also contained in the Modes menu are various facilities for controlling the way colour can be used to enhance the apparent physical form of a figure.

Colour, if used thoughtfully, is a very powerful tool for deceiving the brain into believing that something which is flat is really solid. CAD 3D relies heavily on this visual fraud.

Before going further, I must point out that colour is displayed only in something called Super View. This is an option found in the Views Menu and is really nothing more than the Camera window expanded to fill the whole screen. So, therefore, whenever I refer to an object being coloured, I am talking about when it is looked at in Super View only.



The maximum number of colours which can be displayed at any time is two. Which, on the surface, appears extremely limiting but each of those two colours is in seven shades, increasing to 14 when only one colour is used. Because CAD 3D deals with gradations of colour rather than hues, the effects which can be produced are really realistic.

Apart from shading, the structure of a model can be emphasised by 'lighting' it with three light sources found in a pull-down menu called Light. All three lights can be placed anywhere within the three dimensional environment supporting the models, although they need not all be active.

Linking objects

Most of the operations described have been ones which deal almost entirely with single objects. If that were the case throughout CAD 3D, it would mean that designs could consist only of one single type of model. That is not the case. Another of the pull-down menus, Join, plays host to a collection of tools for linking individual objects in several ways.

If more than one object is present in memory, they can be joined by specifying their names and then inputting a name for the resultant figure. Addition is only one method for creating a new object. Funnily enough, subtracting one from another can also produce a pleasant effect, since the new shape is much the same as the original, minus any of its area previously overlapped by the subtracted object. On the other hand, an operation can be initialised which leaves behind only those parts which were overlapping. Finally, the shape of one object can be stamped on the face of another and the motif illuminated with one of the three light sources.

Two special features worth noting about CAD 3D are its ability to save screens not only in a format it can read but also in such a way so as to be recognisable to painting programs like DEGAS, C.O.L.R. and Neochrome.

The other thing is a primitive but effective in-built animation program which gives users the opportunity to create simple animated sequences frame by frame.

Exciting

CAD 3D is an exciting introduction to computer-aided design. I would be more prone to refer to it as an art program, though, since I do not think that it is as comprehensive as most other true CAD programs on the market.

There are not really any other programs of its type around, so it is difficult to try to compare it to existing CAD or painting packages. Suffice it to say that CAD 3D is something of a fantastic anomaly which anyone who has an Atari ST and is interested in art/design should buy. Because, in its little niche, there is nothing to touch it.

GUIDE TO THIS MONTH'S REVIEWS

(AMIGA SOFTWARE COURTESY OF MPC)

Software Shortlist

Each of the games reviewed in Software Shortlist has been reviewed extensively by our team of reviewers.
We do not include reviews of unfinished products in this section of *Your Computer*; they are the games you can buy now or in the near future.
See the Software News and Preview features for advance news of games being developed.

Watch for the *Your Computer* Soft Stars. They are awarded to games which, in our opinion, offer outstanding value.

KARATE KID PART II

► *Atari ST ● Microdeal ● Arcade ● Jim McClure ● £19.95*

So where is part one? Microdeal would have us believe that *Karate Kid Part II* is the sequel to the Columbia Pictures release but in this movie the fight is yours. With a convincing sound track at the beginning which is Midi-compatible and called The Glory of Love, the game bears a fairly strong resemblance to the movie and its characters – not an easy task with only seven obviously different screens in the one-player mode and only slight cosmetic changes to the first two screens when clocking player two.

Daniel, like all good guys in the movies, is dressed in white and your first enemy is dressed in pink. Either he has bad dress sense or is it a tactic to deter you? The locations where all the fights take place, as you would expect of any good Hollywood set, are perfect in every detail.



Also the players, like many good film stars, are small, and permit a good camera angle but are a strain on the eyes to a short-sighted computer user. That will probably be a problem with all ST arcade games because of the dimensions of the screen and not because of the actors starring in them.

Beating each enemy is effected by striking blows to any part of the body – one point for a hit and two for decking him. After negotiating the first two screens there is a bonus screen. Remember the expression 'You couldn't catch a fly'; well, now is your chance.



Using chopsticks and the knowledge that Miyagi took 40 years to catch one

GRAPHICS
●●●●
SOUND
●●●●●
PLAYABILITY
●●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●●

you cannot miss – after all, it is a movie. The secret is to press the 'P' button before you go insane and get back to what the game is about, karate.

The next two screens are more difficult than the first but to any avid Bruce Lee fan they present no problem. The next bonus screen is set in the kitchen of a Chinese restaurant, probably a chilling thought for some. It appears that the Ice crusher has broken down. Discover the secret of the drum and this will give you Chi, a mystical energy force to which you can feel no pain; you could have done with some of it when you were catching that fly.

It is done by increasing the speed of the drumbeat to a consistant drone. A reinforced joystick to handle the speed may also be required. Hit the fire button to release the energy and again just before the ice block, which is easier said than done.

In the final encounter, Daniel fights Chozen in the castle of King Shobashi. I cannot get you his autograph – I do not even know who he is. The fight takes place on top of an ice tower, which seems as good a place as any. This time the fight is for real. What you were doing in the past, I suppose, was a figment of your imagination. With no stunt men to stand in for you there are two choices – you can live or die. That sounds logical and yet irrational. Surely it is what a good game should be.



FLIGHT SIMULATOR II

► Atari ST ● Sublogic ● Simulation ● Jim McClure ● £49.95



San Francisco Bay area panorama.

Flying is meant to be the safest way to travel – until now. The pilot's seat of a Cessna 182 propellor-engined aircraft or a Gates Learjet get closer to the real thing in the Sublogic *Flight Simulator II* than in any other previous flight simulator. Developed on the PC, the infamous software has earned respectability for testing PC compatibility in the business market. So much for those supposedly serious users. Now that it has been converted for the Mac, ST and Amiga, who wants to be a boring serious user?

Flight Simulator II has five scenarios all based on different locations across the United States. A vast selection of 120 airports is available from small airstrips to large internationals. One of the scenarios is set in the Big Apple, otherwise known as New York, where one of the largest International airports in the world has runways to dwarf the size of any aircraft, let alone a Cessna, and are inviting to a novice pilot, allowing plenty of room for error on approach.



New York's other attractions are best seen from the air. The Statue of Liberty and the twin towers of the World Trade Center in downtown Manhattan are perfect obstacles to fly over, or between. That not only shows off the manouevrability of the aircraft but takes the amazing capability of the 68000 graphics chip to a possible limit.

Other scenarios include Chicago, where the Sears towers can be seen scraping the skyline and Lake Michigan provides freezing waters for those who over-shoot Merrill C. Meigs runway. In the sunshine state of California there are two major locations. The uninviting smog of Los Angeles, probably the least attractive scenario, and San Francisco, the most attractive of all. That leaves only Seattle and, like LA, it is nothing special, which is probably why neither is mentioned on the pre-set locations and can be accessed only by keying-in the co-ordinates.

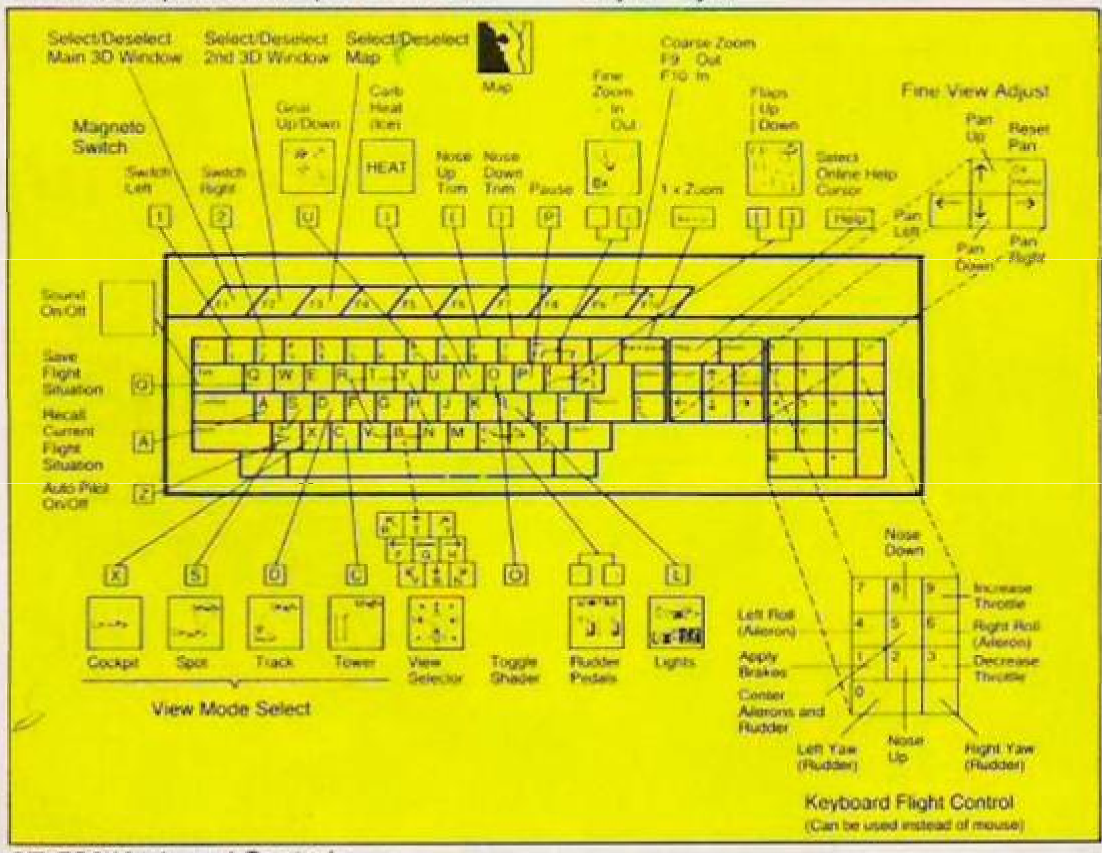
Oakland International sets the scene for your maiden voyage. The Cessna lies ready for take-off at one end of runway 27. Over the navigational radio there is clearance from the tower. You have alpha. Increase throttle until full power is achieved and the aircraft will reach a maximum ground speed of 100 knots. Increase pitch and the aircraft will rise almost vertically. Look back and the runway below will diminish slowly into the landscape. The air speed indicator drops below 40 knots as a result of the sharp climb and the aircraft goes into a nose dive. That can be pulled out of at the last minute without doing anything. I wonder if Biggles had that problem? Wiping the sweat from your brow you can see the skyline of San Francisco and the Golden Gate Bridge. Enhancing allows greater detail of the bridge to be picked up and thoughts of flying underneath it seems to be a greater challenge than trying to land the aircraft for the first time.

Lacking only a stewardess to offer you coffee and in-flight entertainment, the simulator has more desirable features. Pre-setting turbulence at different altitudes and gauge reliability are only minor operations which can be set. Others may range from setting the time



View before take-off.

of day or season, conditions over which not even Maverick of Top Gun could have control. Numerous other functions can be seen in the diagram. The diagram shows an ST keyboard converted into a cockpit and probably has more buttons than the real thing. The software has a manual with 132 pages of instructions showing how to use the various instruments and window options. The simulation is essential for all, so don't just buy it – fly it.



ST-FS2 Keyboard Controls.

PALITRON

► *Amstrad ● The Edge ● Arcade ● Stephen Applebaum ● £8.95*

Ever since Ultima produced its revolutionary method for depicting 3D interiors in games, other software companies have kept the bandwagon rolling by reproducing the same tired thing in a different format. The Edge *Palitron* could, if one were to look at it only fleetingly, be mistaken for one of those sub-quality pastiches.

In reality, Palitron is a great deal more intelligent than many of its contemporaries, since the old theme of negotiating obstacle-laden rooms has been leavened with a smidgen of 'programming'. By which I mean certain things in the game can be controlled using a set of pre-defined functions stored in a logical order to produce an effect either instantaneously or at a later time.

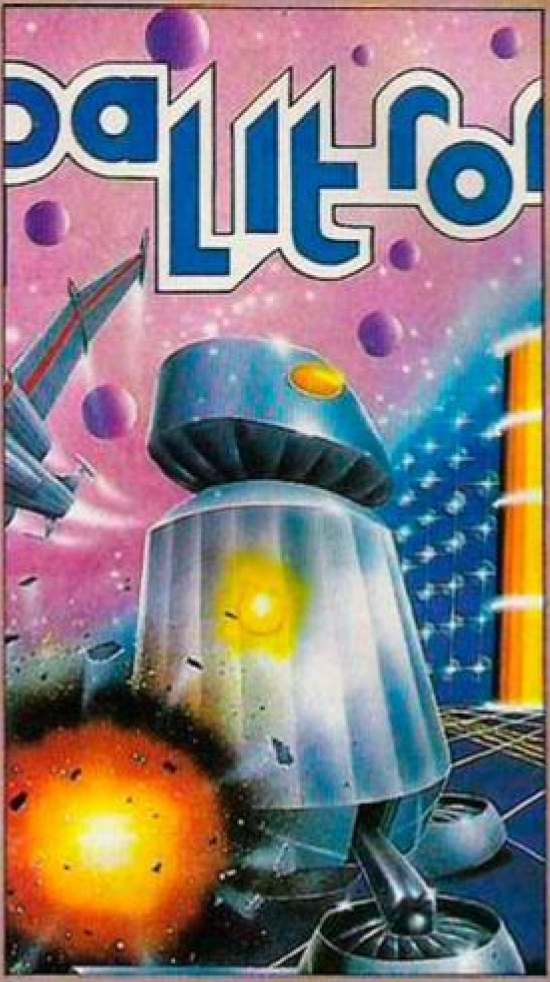
GRAPHICS
● ● ● ●
SOUND
● ● ● ●
PLAYABILITY
● ● ●
VALUE FOR MONEY
● ● ●
OVERALL
● ● ●

Palitron's action takes place in an alien city where someone or something has left some matter-destroying crystals which are slowly killing the planet's inhabitants. Unless they are located and destroyed, the crystals will addle the planet totally.

The object of the game is to guide a robot through the city locations in search of the destructive objects. Dotted about the city are powerful mechanical devices called Class Beast Mark 3 robots. When one of those is found, it can be programmed to perform specific tasks using special commands found in the Palitron manual.

Apart from the programming part, Palitron is a run-of-the-mill game. Its graphics, though, are stunning, placing it above almost every other Amstrad game in this department. Some imaginative sounds complement the colourful graphics perfectly, the two together creating an atmosphere which is changing constantly.

If you have an Amstrad and you like maze games, Palitron is certainly worth a look. It is not the most original game of its ilk on the market but what it does it does better than almost anything else.



BLOOD 'N GUTS

► *C64 ● Action ● Arcade ● Stephen Applebaum ● £9.95*

Long ago, before the advent of civilised man, Earth was inhabited by races of barbarians. Those people were tough, intrepid, and most significantly, stupid. To survive, barbarian man relied on his physical cunning and the respect of his fellow tribesmen.

Barbarian man maintained his fitness and the favour of his peers by competing in bone-crushing tests of strength and agility.

All round the globe, men partook, generally with dire consequences, in games which earned kudos for the winner, but a slow and painful death for the loser.

Since early man could not write, the form those games took went unchronicled and has since been lost in the mists of time. The Action apocryphal *Blood 'n Guts*, if somewhat speculative, endeavours to revive those long-forgotten contests.

Blood 'n Guts follows the fortunes of four of the ancient world's greatest heroes, Nop, Knorr, Hawk and Dog, as they grunt and groan their way through 10 extremely odd and amusingly sick tests of true grit.

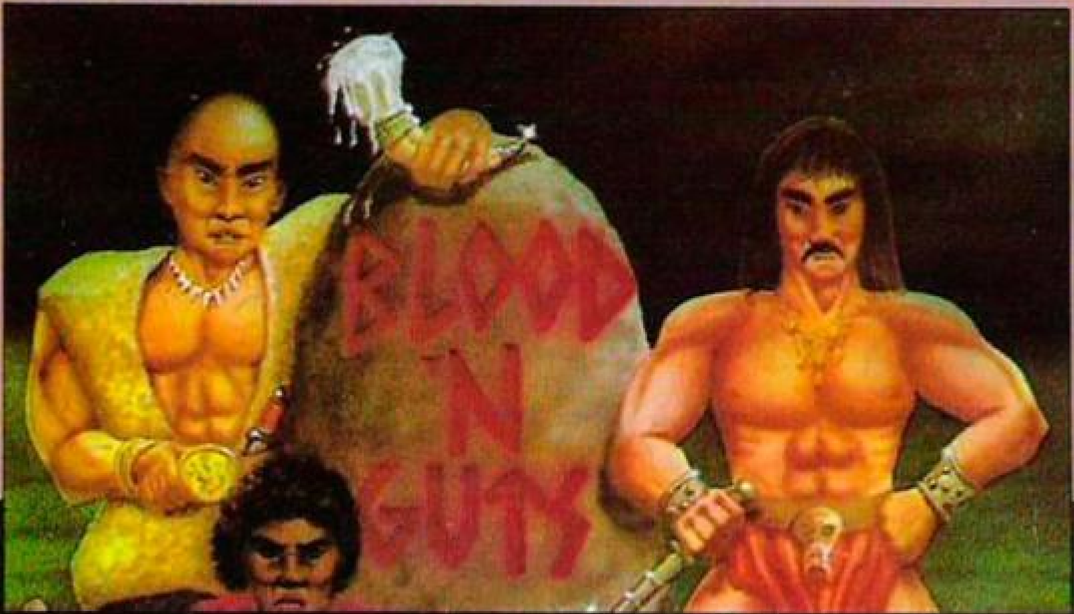
In common with most computer-based sports simulations, Blood 'n Guts has both single- and two-player modes. When the former is selected, the player takes on the persona of one of the champion fighters listed.

The competition starts with a harmless tug of war match, but degenerates into violent farce by the second round and something called Towerjump. In this, a barbarian throws himself off the top of a tower in an attempt to land a greater distance from its base than his opponent. If that were not bad enough, his leap is deemed only legal if he lands on his head.

GRAPHICS
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SOUND
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PLAYABILITY
● ● ● ●
VALUE FOR MONEY
● ● ●
OVERALL
● ● ● ●

As the contest draws on, the events get sillier and the action more stomach-churning; cat haters will love the felicidal Cat Throwing competition, an event exactly like the hammer throw, except that the projectile the barbarian launches from his mits is an unfortunate moggy.

Compared to other games of the sporting genre, Blood 'n Guts is highly original and most definitely over the top. Its knockabout gags make it not unlike the Dangerous brothers or a coach load of Millwall supporters who, were the program not American, could very well have been its creator's muse.



SPACE HARRIER

► *Amstrad ● Elite ● Arcade ● Stephen Applebaum ● £8.95 (cassette) £14.95 (disc)*



Any company which thinks it can reproduce successfully a game which, when it was in the arcades, apparently won most of its popularity through having a moving chair as part of the machine, must be either mad or have inordinate faith in its designers. Any company which succeeds in carrying off such a venture must be very special.

After having played the Amstrad version of *Space Harrier*, I concluded that Elite, one of the most frustrating

GRAPHICS ●●●●
SOUND ●●●
PLAYABILITY ●●●
VALUE FOR MONEY ●●●●
OVERALL ●●●●

software houses in the games market, *is* very special.

Admittedly, I was one of those reviewers who laughed when Elite announced it was to recreate Space Harrier on a home micro. Amstrad Space



it, I asked. It has done it and in doing so cocked-a-snook at many cynics in the computer press.

For readers who have not set foot in an arcade recently, Space Harrier is a shoot-'em-up of the highest quality. The idea is to guide a jet-powered trooper across a multitude of scrolling landscapes, inhabited by all kinds of weird and surreal flora and fauna.

Just as in the original, the trooper in the micro version can be made to run and fly to dodge the hordes of beasts which fly at him relentlessly. There are space ships, rock heads and one-eyed mastadons. When they have been diverted, a small dot, hovering in the distance, suddenly becomes a twisting two-headed dragon which charges forward, threatening to burst out of the screen at you.

Harrier captures a great deal of the feel of the arcade original, although in places the graphics, most of which are simple outline drawings, lack detail.

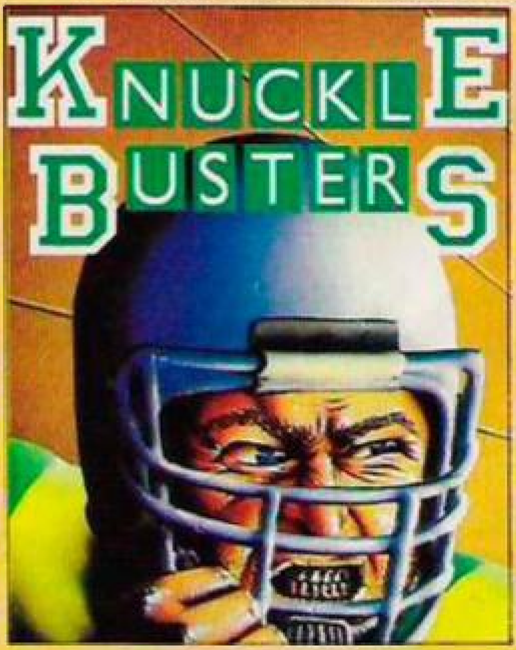
Space Harrier deserves to be a big hit and I have no doubt it will be. People who have played the original might be deterred because they do not sit in a chair which mimics the movement of the joystick; so for them, I have a tip – when you decide to play Space Harrier, drink three large vodkas and wait 20 minutes.

I can assure you that the sensation you will get when playing it after that will be exactly like, if not better, than sitting in a hydraulic chair.



KNUCKLE BUSTERS

► C64/128 ● Melbourne House ● Arcade ● Stephen Applebaum ● £9.95



However many times I read and re-read the credits on *Knuckle Busters*, I still cannot come to terms with the idea that it originates from the company which gave us such milestones of software as *The Hobbit*, *Sherlock* and *Way Of The Exploding Fist*. Which is, I suppose, another sign of the Melbourne House continuing downward slide.

Knuckle Busters is a humourless game which never rises above the belief that violence is the only way. In it, the player becomes a character called Deke, who, when the game begins, is in the process of escaping the confines of a futuristic prison and the horrors of a threatened frontal lobotomy.

I think having the latter performed on oneself would be a bonus when playing Knuckle Busters, as it could only heighten one's enjoyment of it.

GRAPHICS
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SOUND
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PLAYABILITY
● ● ●
VALUE FOR MONEY
● ●
OVERALL
● ●

Controlling Deke, the aim is to break out of the prison and cross the city to a place of sanctuary. Before he can reach his nirvana, our gormless hero must play a dangerous game of cat and mouse with the androids which guard the road to freedom.

Using a joystick, Deke can be made to kick, punch, jump, drop and run. The first two actions are, for the most part, used against the android guards. There are times when the target is a crate or an oil drum, the places in or under which are hidden foodstuffs, extra lives, points and the keys which will effect Deke's passage through the locked doors of the prison.

I would like to be able to say something good about Knuckle Busters graphics, at least, but even they are not really up to the quality expected today. The backgrounds are excellent but are ruined by the awful animated characters which dart about in the foreground. Deke, for example, when he is not running, jumps round the screen like a flea on a high.

If Knuckle Busters has one redeeming quality, it is the brilliant musical score written by the unbiquitous Ron Hubbard. His swirling synthesiser sounds and thumping monotonal beats create a doom-laden atmosphere which helps the game in the sense that it diverts one's attention from its flimsiness.

SKY RUNNER

► CBM64 ● Cascade ● Arcade ● Stephen Applebaum ● £9.95

Cynicism is not something you usually find in a computer game; that is the preserve of politicians, journalists and the disillusioned. The written script of the Cascade Games *Sky Runner* exudes cynicism from every syllable. In a few lines, the game's authors indict politicians and the ambivalent conscience of society, while themselves remaining apolitical – the required modus operandi for populist writing.

GRAPHICS
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SOUND
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PLAYABILITY
● ● ● ●
VALUE FOR MONEY
● ● ●
OVERALL
● ● ●

According to Cascade Games, man's inability to deal with crime will finally be overcome by governments which will introduce drugs into the water supply, so making people too apathetic to exercise free thought.

In the Cascade game, the drug is called 'sky' – after the film Liquid Sky, perhaps? The eponymous 'sky runners' are government-employed 'pushers' who harvest the narcotic. To protect the runners and their giant mechanical sky harvesters from attack, the powers that be employ airborne sky bikers.

Very gradually, benighted governments learn about sky and send out runner squads to prevent the harvest.

As the player, you take the role of a member of the runner squad. When the game begins, you find yourself the pilot of a skimmer, a small craft designed for low-level flight.

The object, initially, is to use the skimmer to shoot out the giant towers which protect the sky harvesters.

When all the towers have been destroyed you cede control of the skimmer and become a sky biker. As with the towers, the object is to destroy the government sky bikers.

Finally, when the last biker is out of the way, your on-board computer informs you where the harvester must be shot to destroy it, so cutting off the supply of sky completely.

Sky Runner is an interesting game, if only for its scenario. How many other programmers have dared to deal with the question of drugs, however tenuous the link?



Inexpensive indexing



The introduction of the Amstrad PC1512 has been followed by a mass of inexpensive software. Here Paul Hendy looks at some databases.

There are several important criteria to consider when buying a database. How much information is to be stored? Should it be simple to use or extremely powerful? Should it use drop-down menus or the mouse? How much does it cost?

Many people expressed doom and despondency when Alan Sugar launched the PC, because it was felt that entering the IBM market meant that users would have to pay hundreds of pounds for software. Those three magic letters seemed to be a licence to add £200 to the price of any word processor or database.

That, however, has in many cases proved not to be so. Many manufacturers have either initiated a new pricing policy whereby they can offer substantial reductions specially for Amstrad machines or, by some miracle/coincidence, all the software development costs have now finally been covered so they can now reduce the price accordingly for all machines. Whichever you believe, the result is cheaper, high-quality software.

With good databases you can often link more than one datafile and that is almost essential in any serious application. A small shop will need a file of customers, accounts, stock and suppliers and they all need to be integrated. A relational database will enable you to type-in a customer's name and the address will be supplied automatically, assuming it is on file; type-in the product and you will be informed whether it is in stock, the price, and delivery date; generate an invoice and store the transaction on the accounts file; and notify the supplier automatically when your stock level runs low.

Several databases were tried on the Amstrad PC and all appeared to behave normally, having been designed to run under the MS-DOS operating system of the IBM machine. There is an important difference in the prices of the packages, so readers must take that into account when reading the comments.

New File can be obtained from NewStar, probably the best-known Amstrad software distributor, and comprises a small ring-binder manual and disc. Of all the packages it has the smallest manual and, though well-written, it lacks some detail and could be better organised.

There is a tutorial section whereby you follow the instructions on the left half of the page, while the right half provides a small explanation of what is happening. That proved to be a helpful way of learning the database and, with the good use of menus on the screen, it was easy to learn how to manipulate data.

There is a two-tier passport arrangement for supervisors to



be able to alter the data and for users able to view the data only. The menu options are largely self-explanatory, e.g., PRINT A REPORT, or AMEND DATABASE DEFINITION and, as a simple, no-nonsense database, able to export data in pure ASCII form for mail-merging with *NewWord*, it has much to commend it.

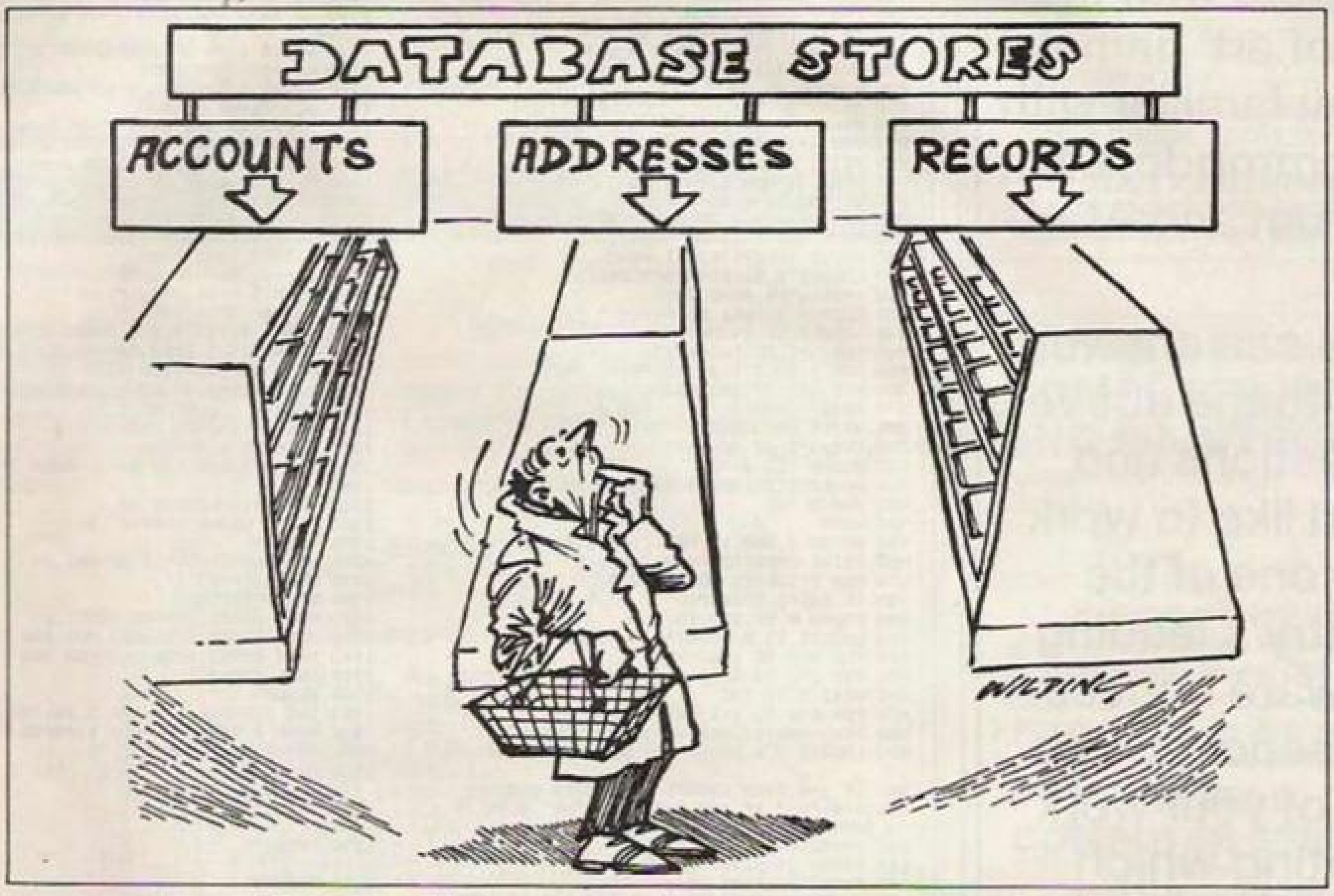
Tas+ – it stands for The Accounting Solution – has a superbly-printed, spiral-bound manual, even though its writers tend to assume that all users are using a hard disc. There is a simple tutorial to follow and I strongly advise users to work through it, because it is a good form of training. It is a fine database to use, with drop-down menus all over the place to make the handling of data very easy. The system operates with a programming language – you can join several commands in special sequences to make your life easier, not having to type each one individually, and to enable the system to run more efficiently and faster.

Form painting

With this language you can design your database on the screen – known as form-painting – and when finished, Tas will write the appropriate program. You can then edit and add to the programs to incorporate more features as you become more proficient with the language. It is a relational database and can cope with 16 files open at the same time. It is not so powerful as *VPInfo* or *dBase III* but I understand a Mk2 version with go-faster stripes is on the horizon. For £69 it represents excellent value.

Discs and a ring binder of solid text with few illustrations make up the *Superfile* package

but do not be deterred by that. It is a powerful data management system worthy of further investigation. One of the really good features about Superfile is its logically equivalent field. If you are searching for all people who live in Aberdeen, but out of the three address fields, Aberdeen may be in field 2 or 3. In which do you search? Superfile will allow you to search both, treating them both as an address field. To quote the manual: "It is very useful for handling any sort of shortlist of vaguely-defined qualities."



Accessing data

Superfile does not have its own built-in language as such. Instead the manual states that because Superfile joins on to the operating system and stays in the machine with any other program you may load, it is possible to interface with almost any standard language. A section of the manual explains in detail how data is stored, to enable programmers to access it from Basic, Cobol and so on. This is a very interesting concept, as it obviates the need to learn yet another language.

A good deal of reading is needed with Superfile because it is rather difficult to follow. The package contained a price list, revealing the staggering sum of £685 but on the reverse side it advertised a special Amstrad price of £200 – an encouraging trend. Superfile has established a solid reputation. Many schools/ colleges use it on the RML Nimbus but I feel it needs to be made more approachable.

dBase II, the big daddy of all databases, was developed years ago for the American space programme and since then has become the yardstick by which others are measured. A newcomer would find it very slow and unfriendly, because it is at its most powerful once you have taken time to master the built-in programming language. The designer, Ashton-Tate, has upgraded to *dBase III+*, a true giant among databases, with two massive manuals and seven discs, one of which is a badly-needed tutorial.

Similar concepts

If you are conversant with a programming language such as Basic, learning dBase would be considerably easier, because the overall concepts are similar, with DO-WHILE loops and IF-ELSE statements. dBase programs, called command files, are run with DO at the dot prompt – the dBase equivalent of the A> prompt of CP/M and MS-DOS.

dBase II can be purchased for approximately £120, with dBase III+ costing more. The latter, however, is unbelievably powerful. A two-stage compiler is built-in, to convert your programs into a type of machine code able to run much faster and stored in a non-readable form, so that if you are selling an application commercially, customers cannot break in and pirate your source code.

VPInfo is a clone of dBase III+ and so will be familiar to any who have used dBase II or III on other machines, including II on the PCW. The difference is that VPInfo costs less than £100. The single manual is very thick, with thin paper, so plenty of reading is necessary to master this database.

Almost inevitably, I suppose, this aggressively-priced clone with apparently more features than the original, is from NewStar, home of NewWord, the clone of *WordStar* with more features. There are minor differences in the commands and the manual needs to be read from beginning to end. While that sounds like a truism, with the dBase manuals the arrangement is slightly different and you use sections as and when required.

Of the databases tried, VPInfo stands out as the most powerful for the money, because it is a clone of the master – dBase III – with a built-in, single-stage compiler.

Tas will accept dBase files but is not completely compatible but for less than £70 it fulfils most needs in a delightful way.

Powerful

Superfile is difficult to understand but is clearly a very powerful system. Not being so popular as dBase, there are not many books to help.

The ultimate, in terms of weight, printed matter, discs, support books, and price must be dBase III+.

It is difficult to conceive of a database application which could not be solved by the package – and therefore VPInfo as well.

PINBALL

◆ *Amstrad CPC range* ● *D. K. Huff*

A combination of two favourites has here produced a fun and very playable game, which also serves as a good example of how simple writing a good game can be. Full instructions are included with the game. It takes a surprisingly short time to load and save. The object of the game is, as with the original pinball machines, to keep the ball in play for as long as possible. In this version, however, you do not have two flippers, but a bat, similar to that in *Breakout*.

```
100 SYMBOL AFTER 256
110 MEMORY 24999:SYMBOL AFTER 33
120 RESTORE 2240:FOR j=25000 TO 25074
130 READ a:POKE j,a:NEXT
150 GOSUB 1850:GOSUB 1480
160 PEN 2:LOCATE 3,8
170 PRINT"Press <SPACE to start game";
180 FOR j=1 TO 3:LOCATE 2,j+3
190 PRINT STRING$(15,"%");:NEXT
200 WINDOW 34,39,5,20
210 PRINT"SCORE:          0"
220 PRINT:PRINT:PRINT"  High scores"
230 FOR j=1 TO 5
240 PRINT USING"#######";h(j);
250 NEXT:WINDOW 1,40,1,25
260 pn=240:sc=0:in=0:bal=5
270 PEN 1:LOCATE 32,24:PRINT "(((((";
280 MOVE pn,46:DRAWR 46,0,1
290 WHILE INKEY(47)=-1:WEND
300 LOCATE 2,8:PRINT SPACE$(29);
310 x=31:y=24:dx=0:dy=0
320 LOCATE 31+bal,24:PRINT " ";
330 LOCATE 31,24:PRINT"(";
340 FOR j=1 TO 100:NEXT
350 PEN 1:LOCATE 31,25:PRINT "*";
360 FOR j=1 TO 100:NEXT
370 PRINT CHR$(8);")";:PEN 2
380 WHILE dx=0:GOSUB 770
390 FOR j=1 TO 20:NEXT
400 GOSUB 720:WEND
410 WHILE y<25:GOSUB 880
420 GOSUB 720
430 WEND
450 SOUND 7,500,10:PEN 1:LOCATE x,y
460 PRINT CHR$(130);:bal=bal-1
470 PEN 2:LOCATE 30,10:PRINT " ";
480 IF bal>0 THEN 290
500 SOUND 3,60,200,10,0,1
510 LOCATE 13,8:PRINT"Game over";
520 FOR k=1 TO 1500:NEXT
530 FOR j=1 TO 5:IF sc>h(j) THEN 550
540 NEXT:GOTO 630
550 FOR k=5 TO j+1 STEP -1
560 h(k)=h(k-1):NEXT:h(j)=sc
570 LOCATE 7,8:PRINT"You have achieved the"
;
580 IF j=1 THEN LOCATE 10,9:GOTO 620
590 pl$="th":IF j=2 THEN pl$="nd" ELSE IF j
=3 THEN pl$="rd"
600 j$=STR$(j):LOCATE 14,9
610 PRINT j$+pl$;:LOCATE 10,10
620 PRINT"highest score"
630 WHILE INKEY$<>"":WEND:FOR j=1 TO 1500
640 IF INKEY$<>"" THEN 660
650 NEXT
660 LOCATE 3,8:PRINT"Press <SPACE> to play
again";
670 LOCATE 10,9:PRINT SPACE$(13);
680 LOCATE 10,10:PRINT SPACE$(13);
690 MOVE pn,46:DRAWR 46,0,0
700 GOTO 180
720 po=pn:IF INKEY(34)<>-1 AND po>64 THEN p
n=pn-16
730 IF INKEY(27)<>-1 AND po<368 THEN pn=pn+
16
740 MOVE po,46:DRAWR 46,0,0
750 MOVE pn,46:DRAWR 46,0,1:RETURN
770 IF y=10 THEN 820
780 LOCATE x,y:PRINT " ";
790 y=y-1:IF y=10 THEN x=x-1
800 LOCATE x,y:PRINT "(";
810 RETURN
820 dx=-1:dy=CINT(RND)
830 PEN 1:LOCATE x,y:PRINT "!";
840 PEN 2:x=x-1:y=y+dy
850 LOCATE x,y:PRINT "(";
860 RETURN
880 ox=-dx:oy=-dy:GOSUB 1420
890 ON PEEK(24995) GOTO 1010,900,900,910,93
0,960
900 dx=-dx:GOTO 1010
910 dy=1:dx=0:GOTO 1010
920 GOTO 1010
930 LOCATE x+dx,y:PRINT" ";
940 SOUND 1,200,0,0,1:in=20:GOSUB 1340
950 dx=-dx:GOTO 1010
960 SOUND 2,250,0,0,1:in=50:GOSUB 1340
970 dx=-dx:IF dy=0 THEN dy=SGN(INT(RND*7-3)
):GOTO 990
980 dy=CINT(RND)*dy
990 GOSUB 1430:IF PEEK(24997)=1 THEN 1010
1000 dy=-dy:GOTO 1300
1010 ON PEEK(24996) GOTO 1210,1020,1030,130
0,1040,1070,1150,1170
1020 dy=-dy:GOTO 1300
1030 dx=1:GOTO 1300
1040 LOCATE x,y+dy:PRINT " ";
1050 SOUND 1,200,0,0,1:in=20:GOSUB 1340
1060 dy=-dy:GOTO 1300
1070 SOUND 2,250,0,0,1:in=50:GOSUB 1340
1080 dy=-dy:IF dx=0 THEN dx=SGN(INT(RND*7-3
)):GOTO 1100
1090 dx=CINT(RND)*dx
1100 IF dx=0 AND dy=0 THEN dx=ox:dy=oy:GOTO
 1300
1130 GOSUB 1430:IF PEEK(24997)=1 THEN 1300
1140 dx=-dx:GOTO 1300
1150 SOUND 4,170,0,0,1:in=100:GOSUB 1340
1160 dy=-dy:GOTO 1300
1170 IF po<pn AND dx<1 THEN dx=dx+1
1180 IF po>pn AND dx>-1 THEN dx=dx-1
1190 IF x=26 AND dx=1 THEN dx=-1
1200 dy=-dy:SOUND 1,338,0,0,1:GOTO 1300
1210 IF PEEK(24996)*PEEK(24995)<>1 THEN 130
0
1220 ON PEEK(24997) GOTO 1300,1230,1230,130
0,1240,1260,1300,1290
1230 dy=-dy:dx=-dx:GOTO 1300
1240 LOCATE x+dx,y+dy:PRINT" ";
1250 dx=-dx:GOTO 1050
1260 SOUND 2,250,0,0,1:in=50:GOSUB 1340
1270 IF RND>0.5 THEN dx=-dx:dy=0:GOTO 1300
1280 dx=0:dy=-dy:GOTO 1300
1290 dy=-1:dx=0:SOUND 1,338,0,0,1
1300 LOCATE x,y:PRINT " ";
1310 x=x+dx:y=y+dy:LOCATE x,y
1320 PRINT"(";:RETURN
1340 IF sc<10000 AND sc+in>9999 THEN GOSUB
1380
1350 sc=sc+in:LOCATE 34,7
1360 PRINT USING"######";sc;
1370 RETURN
1380 bal=bal+1:LOCATE 30+bal,24
1390 PEN 1:PRINT"(";
1400 PEN 2:RETURN
1420 POKE 24990,y:POKE 24991,x
1430 POKE 24992,(256+dx) MOD 256
1440 POKE 24993,(256+dy) MOD 256
1450 CALL 25000
1460 RETURN
1480 INK 0,0:INK 1,6:INK 2,26:INK 3,18
1490 MODE 1:BORDER 1:PEN 1:PAPER 0
1500 PRINT STRING$(31,"!")
1510 PRINT"!                  !!!! !   ! !!
 !!"
1520 PRINT"!                  !!
 !!"
1530 PRINT"!                  .!
 !!"
1540 PRINT"!                  !
 !!"
1550 PRINT"!
 !!"
1560 PRINT"!
 !!"
1570 PRINT"!
  !"
1580 PRINT"!
 !!!"
1590 PRINT"!
  !"
1600 PRINT"!                 !!!
 ! !"
1610 PRINT"!
 ! !"
1620 PRINT"!  !
 ! !"
1630 PRINT"!  !                          !
  ! !"
1640 PRINT"!  !                          !
  ! !"
1650 PRINT"!  !                         *!
   ! !"
1660 PRINT"!  !                          *
 ! !"
1670 PRINT"!  !                !       $
 ! !"
1680 FOR j=1 TO 4
1690 PRINT"!  !                          !
 ! !"
1700 NEXT
1710 PRINT"!  !                          !
 ! !!!!!!"
1720 PRINT"!
 !      !"
1730 PRINT"!
 !)!!!!!!"
1740 LOCATE 5,20:PRINT "!";
1750 PEN 3:FOR j=1 TO 25:READ x,y
1760 LOCATE x,y:PRINT "&";:NEXT
1770 PEN 2:FOR j=1 TO 11:READ x,y
1780 LOCATE x,y:PRINT "'";:NEXT
1790 MOVE 0,399:DRAWR 320,0,1
1800 MOVE 0,0:DRAWR 478,0
1810 LOCATE 33,2:PEN 3
1820 PRINT"PINBALL":RETURN
```

```
1850 SYMBOL 33,255,255,255,255,255,255,255,
255
1860 SYMBOL 35,255,127,63,31,15,7,3,1
1870 SYMBOL 36,128,192,224,240,248,252,254,
255
1880 SYMBOL 37,126,126,126,126,126,126,0,0
1890 SYMBOL 38,60,66,153,189,189,153,66,60
1900 SYMBOL 39,0,126,24,60,102,102,255,255
1910 SYMBOL 40,0,56,124,254,254,124,56,0
1920 SYMBOL 41,126,126,24,56,28,56,28,56
1930 SYMBOL 42,0,0,0,0,0,126,126,60
1940 SYMBOL 129,255,0,0,0,0,0,0,0
1950 SYMBOL 130,0,0,0,0,0,0,0,255
1960 ENV 1,6,-2,3:ENT 1,200,5,2
1970 FOR i=j TO 5:h(j)=1000:NEXT
1980 CALL &BC02:INK 2,18
1990 MODE 1:LOCATE 17,4
2000 PEN 1:PRINT"PINBALL"
2010 MOVE 256,332:DRAWR 110,0,3
2020 LOCATE 13,7
2030 PRINT"by D. Huff
2040 PEN 2:WINDOW 3,37,10,25
2050 PRINT" Guide the ball around the pinba
ll"
2060 PRINT"table using the bat."
2070 PEN 1:PRINT
2080 PRINT"  Controls :-<O> moves bat left"
2090 PRINT"              <P> moves bat right
"
2100 PRINT"   <SPACE> releases the balls"
2110 PEN 3:PRINT
2120 PRINT"SCORES : '-100 pts & - 50 pts"
2130 PRINT:PRINT TAB(10)"Abrick - 20 pts"
2140 PEN 2:PRINT
2150 PRINT"A bonus ball is given at 10000 p
ts"
2160 PRINT:PRINT"   Press any key to start"
2170 WHILE INKEY$<>"":WEND
2180 CALL &BB18:RETURN
2240 DATA 42,158,97,58,160,97,132,103
2250 DATA 245,205,117,187,205,96,187
2260 DATA 221,33,163,97,205,218,97,42
2270 DATA 158,97,58,161,97,133,111,205
2280 DATA 117,187,205,96,187,221,35
2290 DATA 205,218,97
2300 DATA 241,205,111,187,205,96,187
2310 DATA 221,35,6,8,33,235,97,190,40,5
2320 DATA 35,16,250,6,1,221,112;0,201
2330 DATA 129,39,38,37,35,36,33,32
2340 DATA 21,2,27,2,19,3,29,3,18,4,30,4
2350 DATA 21,5,27,5,24,6,20,7,28,7,31,8
2360 DATA 24,9,6,10,15,11,19,11,15,12
2370 DATA 19,12,29,13,10,14,24,14,28,15
2380 DATA 5,16,5,17,17,17,5,18,16,18
2390 DATA 18,18,5,19
2400 DATA 3,1,6,1,9,1,12,1,15,1,23,2
2410 DATA 24,2,25,2,16,12,17,12,18,12
```

POWERHOUSE

◆ Any Spectrum ● T. Glover

The year is 1990 and already nuclear reactors are springing up everywhere. You have been assigned the job of destroying all the nuclear reactors before they build so much waste that they become a hazard.

To achieve this you must collect 10 power packs – the purple blobs – to enable you to destroy each reactor. Excellently programmed, the game features Currah Speech, pause feature and an excellent high score table.

```
   0 >REM      POWERHOUSE
      © INFINITE SOFTWARE 1984
   1 BORDER 0: PAPER 0: INK 6: C
LS : GO TO 15
   2 BORDER 0: PAPER 0: INK 6: C
LS
   3 CLEAR 32499: PRINT AT 10,10
; FLASH 1;"STILL LOADING"
   5 LOAD ""CODE USR "A"
  15 LET hs=5360: LET N$="CLEVER
 TREVER": POKE 23658,8
  16 LET S$="s(tt)op (DTH)(ee) (
TT)(aa)p"
  17 CLS : FOR F=1 TO 140: PRINT
 BRIGHT 1;AT 1,10; INK F/20+2;"S
TOP THE TAPE": NEXT F: PRINT AT
1,10; INK 6;"              "
  22 PRINT AT 8,12;"POWERHOUSE",
AT 10,3;"WOULD YOU LIKE INSTRUCT
IONS": FOR F=1 TO 20: BEEP .1,20
: NEXT F
  25 GO SUB 5000
  27 IF INKEY$="Y" THEN GO TO 40
  30 IF INKEY$="N" THEN GO TO 10
0
  35 GO TO 27
  39 REM INSTRUCTIONS
  40 PRINT #1;AT 0,9; INK 0; PAP
ER 6;"POWER HOUSE"
  50 PRINT #1;''"DESTROY AS MANY
 NUCLEAR REACTORSAS YOU CAN BY G
ETTING TEN POWER PACKS FOR EACH
ONE YOU EXPLODE."''"WATCH OUT FO
R THE WALLS-THEY'RE ELECTRIFIED!
...AND IF YOU TOUCH THE NUCLEAR
WASTE YOU WILL ALSO BE DESTROYED
"
  60 PRINT #1;'"KEYS ARE>"''"
UP    DOWN     LEFT     RIGHT"''"
  Q       A        O         P"''
  65 PRINT #1;'"     PRESS H TO H
OLD THE GAME"
  70 PRINT #1;'TAB 4; FLASH 1; P
APER 6; INK 0;"PRESS ANY KEY TO
PLAY"
  75 FOR f=0 TO 50: BEEP .01,f:
NEXT f
  80 PAUSE 0: COPY
  99 REM START NEW GAME
 100 FOR f=0 TO 50: BEEP .01,f:
NEXT f
 120 LET aa=1: LET xx=0: LET pp=
0: LET AL=0
 150 LET sc=0
 159 REM START NEW LEVEL
```

```
 200 BORDER 0: PAPER 0: INK 9: C
LS
 250 LET x=10: LET y=10
 300 GO SUB 9200
 350 REM PRINT REACTORS
 400 FOR f=1 TO aa: PRINT INK 6;
 BRIGHT 1;AT RND*15+3,RND*25+3;"
A": NEXT f
1999 REM MOVE PLAYER
2000 IF INKEY$="O" THEN PRINT AT
 x,y;" ": LET y=y-1
2010 IF INKEY$="P" THEN PRINT AT
 x,y;" ": LET y=y+1
2020 IF INKEY$="A" THEN PRINT AT
 x,y;" ": LET x=x+1
2030 IF INKEY$="Q" THEN PRINT AT
 x,y;" ": LET x=x-1
2039 REM HOLD
2040 IF INKEY$="H" THEN PRINT AT
 10,10; INK 3; PAPER 6; FLASH 1;
"GAME SUSPENDED": FOR f=1 TO 50:
 BORDER 3: NEXT f: PAUSE 0: PAUS
E 0: PRINT AT 10,10; PAPER 0;"
                ": BORDER 0
2049 REM TEST FOR WALL
2050 IF y<>11 AND y<>22 AND x<1
OR y<>11 AND y<>22 AND x>20 OR y
<>11 AND y<>22 AND x<1 OR y<>11
AND y<>22 AND x>20 OR y<1 OR y>3
0 THEN GO TO 9500
2059 REM GO THROUGH GAPS
2060 IF x=0 AND y=11 OR x=0 AND
y=22 THEN LET x=20
2070 IF x=21 AND y=11 OR x=21 AN
D y=22 THEN LET x=1
2074 REM PRINT EXTRA REACTORS
2075 IF RND*100<3 THEN PRINT INK
 6; BRIGHT 1;AT RND*15+3,RND*25+
3;"A"
2079 REM TEST SCREEN
2080 IF ATTR (x,y)=70 AND pp<10
THEN GO TO 9500
2081 REM CHECK FOR REACTOR
2082 IF ATTR (x,y)=70 THEN PRINT
 AT x,y-1; PAPER 0;"100": GO SUB
 9800: LET xx=xx+1: LET pp=pp-10
: LET sc=sc+100: PRINT AT x,y-1;
"  "
2085 IF xx=aa THEN GO TO 9700
2089 REM CHECK FOR POWER PACK
2090 IF ATTR (x,y)=3 THEN FOR F=
1 TO 7: PRINT AT X,Y; INK F;"o":
 NEXT F: POKE 32507,0: LET l=USR
 32500: LET sc=sc+10: LET pp=pp+
1
2094 REM CHECK FOR FALLOUT
2095 IF ATTR (x,y)=68 THEN GO TO
 9500
2099 REM PRINT PLAYER & SCORE
2100 IF AL=0 THEN PRINT AT X,Y;
INK 5; BRIGHT 1;"O": LET AL=1: G
O TO 2150
2110 IF AL=1 THEN PRINT AT X,Y;
INK 5; BRIGHT 0;"O": LET AL=0
2150 PRINT #1;AT 1,0; PAPER 2;"S
CORE>";sc;AT 1,12;"LEVEL>";aa;AT
 1,22;"POWER>";pp;"  "
2160 IF PP<10 THEN PRINT #1;AT 0
,4; FLASH 1; INK 7;"YOU NEED SOM
E POWER PACKS"
2170 IF PP>=10 THEN PRINT #1;AT
0,0;"
                                "
2200 GO SUB 3000
2300 GO TO 2000
3000 REM PRINT P/P & FALLOUT
3010 LET a=RND*19+1: LET b=RND*2
9+1
3015 PRINT AT a,b; INK 3; BRIGHT
 0;"■"
3020 IF ATTR (a,b+1)=70 THEN PRI
NT AT a,b+1;"  "
3025 IF ATTR (a,b-1)=70 THEN PRI
NT AT a,b-2;"  "
3030 LET a=RND*19+1: LET b=RND*2
9+1
3040 PRINT BRIGHT 1; INK 4;AT a,
b;"■"
3050 IF ATTR (a,b+1)=70 THEN PRI
NT AT a,b+1;"  "
3060 IF ATTR (a,b-1)=70 THEN PRI
NT AT a,b-2;"  "
3150 RETURN
5000 REM MACHINE CODE SOUND
5005 RESTORE
5010 FOR f=32500 TO 32525: READ
 c: POKE f,c: NEXT f
5030 FOR f=32580 TO 32596: READ
 c: POKE f,c: NEXT f
5040 FOR f=32530 TO 32549: READ
 c: POKE f,c: NEXT f
```

```
5050 RETURN
5100 DATA 6,1,197,33,0,3,17,1,0,
229,205,181,3,225,17,16,0,167,23
7,82,32,240,193,16,233,201
5300 DATA 33,0,2,43,126,211,254,
06,1,05,32,-3,175,132,200,24,-14
5400 DATA 6,5,197,6,0,197,6,198,
120,211,254,16,-5,193,16,-11,193
,16,-17,201
9200 REM PRINT WALL
9205 PRINT INK 4; BRIGHT 1;"████
█████████ ██████████████ █████████████"
9210 FOR f=1 TO 21: PRINT INK 4;
 BRIGHT 1;AT f,0;"█";AT f,31;"█"
9250 NEXT f
9260 PRINT INK 4; BRIGHT 1;AT 21
,0;"████████████ ██████████ ██████
████"
9270 INK 9
9300 RETURN
9500 REM END GAME
9510 PRINT #1;AT 0,0;"
                              "
9511 IF pp>=10 OR ATTR (x,y)<>70
 THEN LET D=USR 32530: PRINT #1;
AT 1,0; INVERSE 1;" YOU GOT ELEC
TRIFIED-TRY AGAIN! ": LET s$="Y(
ouu)(GGG)'O(T)  (ee)LE(ck)t(r)(i)
(F)(II)(ee)(DD)  .  (T)r(ii) A(GGG
)'(ay)n"
9514 PAUSE 100
9515 IF pp<10 AND ATTR (X,Y)=70
THEN PRINT #1;AT 1,0; FLASH 1;"
 YOU DIDN'T HAVE ENOUGH POWER   "
: FOR F=1 TO 100 STEP 3: POKE 32
588,F: RANDOMIZE USR 32580: NEXT
 F
9520 FOR f=50 TO 0 STEP -3: BEEP
 .02,f: NEXT f
9530 IF sc>hs THEN PRINT PAPER 2
; INK 6; FLASH 1;AT 21,1;"YOU HA
VE BEATEN THE HIGH SCORE": LET s
$="": POKE 23658,8: INPUT "ENTER
 YOUR NAME>>";n$: LET hs=sc
9533 IF N$( TO 3)<>"CLE" THEN LE
T S$="(CK)'ON(GGG)RA(TT)(Y)(OO)L
(AY)(SH)UN(Z)"
9535 FOR f=0 TO 21: PRINT AT f,0
; PAPER 0;"
                ": NEXT f
9536 PRINT AT 6,5;"█████████████
████████████"
9537 FOR F=7 TO 15: PRINT AT F,5
;"█";AT F,26;"█": NEXT F
9538 PRINT AT 16,5;"█████████████
████████████"
9540 PRINT AT 8,8;"LEVEL>>";aa;A
T 10,6; PAPER 2;"YOU SCORED>>";s
c;AT 12,8;"HIGH SCORE>>";hs;AT 1
4,8;"by ";n$
9544 IF N$="CLEVER TREVER" THEN
LET S$="(H)(II) (S)(CK)(OR) (BB)
(II) KLE(V)(ER) (T)R(e)(V)(ER)"
9545 IF aa<2 THEN PRINT AT 0,12;
"LEARNER"
9546 IF aa>1 AND aa<5 THEN PRINT
 AT 0,13;"NOVICE"
9547 IF aa>4 AND aa<8 THEN PRINT
 AT 0,11;"MODERATE"
9548 IF aa>7 AND aa<11 THEN PRIN
T AT 0,10;"VERY GOOD"
9549 IF aa>10 AND aa<21 THEN PRI
NT AT 0,10;"EXCELLENT"
9550 IF aa>=20 THEN PRINT AT 0,6
;"COMPUTER WHIZZ KID": FOR f=1 T
O 50: PRINT OVER 1; PAPER INT (R
ND*5+2);AT 0,6;"
  ": BEEP .005,f: NEXT f
9660 PRINT #1;AT 1,0;"        ANOT
HER GAME? (Y/N)          "
9670 IF INKEY$="y" OR INKEY$="Y"
 THEN GO TO 100
9680 IF INKEY$="n" OR INKEY$="N"
 THEN CLS : PRINT AT 10,10; FLAS
H 1; INK 2; PAPER 6;"START THE T
APE": LET S$="ST(AR)(TT)  (DTH)(E
E)  (TT)(AA)P": FOR F=0 TO 300: N
EXT F: LOAD ""
9690 GO TO 9560
9700 REM CHANGE LEVEL
9705 LET S$="(N)e(ck)(s)t Le(V)U
(L)"
9710 FOR f=1 TO 19: PRINT AT f,1
;"
": NEXT f
9720 LET aa=xx+1
9730 LET XX=0
9740 BORDER RND*7
9750 GO TO 200
9800 REM EXPLOSION
9810 LET A$="()Oo. "
9815 POKE 32588,50: FOR F=1 TO 1
```

```
0: LET D=USR 32580: BORDER 0: NE
XT F
9816 LET s$="Ue(ll) (DD)(U)n"
9820 FOR f=1 TO LEN a$
9830 FOR g=0 TO 2
9840 PRINT PAPER 0; INK f+3; BRI
GHT 1;AT x,y;a$(f);AT x+g,y;a$(f
);AT x,y+g;a$(f);AT x-g,y;a$(f);
AT x,y-g;a$(f)
9845 PRINT PAPER 0; INK F+3; BRI
GHT 1;AT X-G,Y-G;A$(F);AT X+G,Y+
G;A$(F);AT X+G,Y-G;A$(F);AT X-G,
Y+G;A$(F)
9850 NEXT G
9860 NEXT f: RETURN
9998 REM SAVE
9999 SAVE "POWERHOUSE" LINE 2: S
AVE "[illegible]HI•[illegible]"CODE USR "A",21*8:
 VERIFY ""
```

GUESS THE PAIR

◆ *Any Spectrum* ● *N. Panagiotides*

Although neither arcade nor adventure, this game will be familiar to almost everyone who types it in. Based on the all-time classic card game, as featured many times on Play School, this version of Pairs uses a five by four grid, for a total of 20 squares – 10 pairs.

The object of the game is to match each of the 10 pairs as quickly as possible. Once this has been achieved, the computer will tell you how long you took and then generate a completely new and random grid.

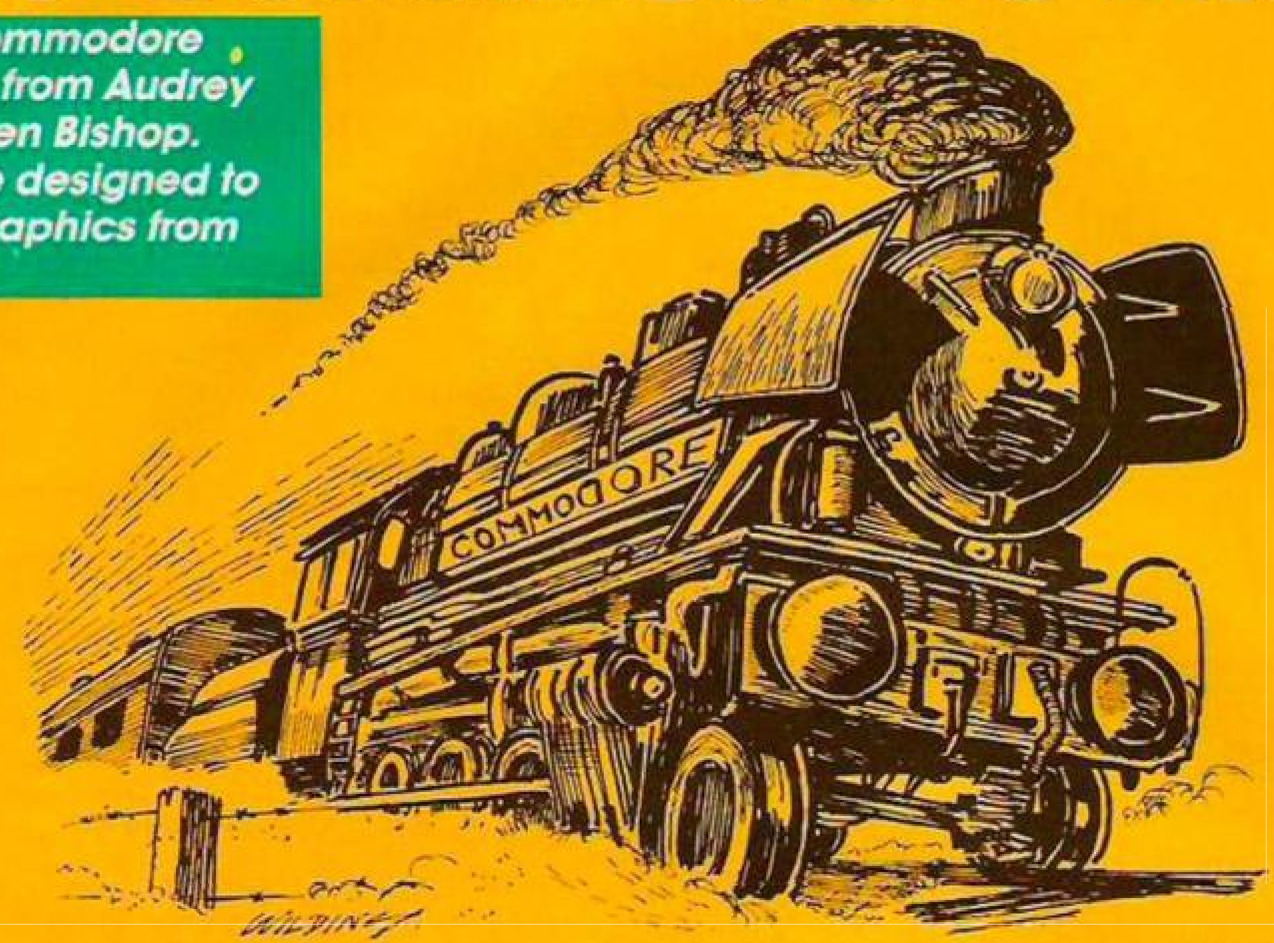
```
  30 BORDER 6: PAPER 6: INK 1: C
LS
  40 FOR i=1 TO 10
  50 READ h$
  60 FOR j=0 TO 7
  70 READ gr: POKE USR h$+j,gr
  80 NEXT j: NEXT i
  90 DIM a(20): DIM b(10)
 100 GO SUB 1100
 102 GO SUB 1200
 104 LET cnt=0: PRINT AT 21,3;"
                 ": PRINT AT 0,16
;cnt;" ": PRINT AT 20,14;"
 "
 110 GO SUB 2200
 122 DEF FN f()=65536*PEEK 23674
+256*PEEK 23673+PEEK 23672
 124 LET t1=FN f()
 126 IF INKEY$="" THEN GO TO 126
 128 LET b$=INKEY$
 130 IF INKEY$<>"" THEN GO TO 13
0
 140 LET g$=b$: GO SUB 6600
 142 IF c*(21-c)<=0 THEN GO TO 1
26
 144 GO SUB 7700
 146 IF ch=1 THEN GO TO 126
 150 LET w1=a(c): GO SUB 3300
 154 IF INKEY$="" THEN GO TO 154
 156 LET b$=INKEY$
 160 IF INKEY$<>"" THEN GO TO 16
0
 164 IF b$=g$ THEN GO TO 154
 170 GO SUB 6600
 180 IF c*(21-c)<=0 THEN GO TO 1
54
 184 GO SUB 7700
 186 IF ch=1 THEN GO TO 154
 190 LET w2=a(c): GO SUB 4400*(w
1=w2)+5500*(w1<>w2)
 192 IF cnt=10 THEN GO TO 8010
 200 GO TO 126
1000 REM prints the *'s
1100 FOR i=2 TO 18 STEP 4: FOR j
=6 TO 26
1110 PRINT AT i,j;"*"
1120 NEXT j: NEXT i
1130 FOR j=6 TO 26 STEP 4: FOR i
=2 TO 18
1140 PRINT AT i,j;"*"
1160 NEXT i: NEXT j
1170 RETURN
1190 REM prints the letters
1200 FOR i=1 TO 4: FOR j=1 TO 5
1210 PRINT AT 4*i,4*j+4;CHR$ (5*
(i-1)+j+96)
1220 NEXT j: NEXT i
1230 RETURN
2000 PEM makes an arbitrary corr
espondance of letters to figures
```

```
2200 FOR i=1 TO 20: LET a(i)=i:
NEXT i
2210 RANDOMIZE
2220 FOR j=1 TO 19
2230 LET i=INT ((20-j)*RND)+j+1
2240 LET ex=a(j): LET a(j)=a(i)-
10*(a(i)>10): LET a(i)=ex
2250 NEXT j
2252 LET a(20)=a(20)-10*(a(20)>1
0)
2260 RETURN
3000 REM prints the figures corr
esponding to the pair one hits
3300 LET v=INT ((c-1)/5): LET w=
c-5*v
3310 PRINT AT 4*(v+1),4*(w+1);CH
R$ (143+w1)
3320 RETURN
4000 REM two correct hits
4400 LET cnt=cnt+1
4404 LET b(cnt)=w1
4410 PRINT AT 0,16;cnt
4420 GO SUB 3300: BEEP .2,26
4430 RETURN
5000 REM two bad hits
5500 LET w1=w2
5510 GO SUB 3300: BEEP .7,-8
5520 LET f=CODE g$-97: LET d=COD
E b$-97
5530 LET f1=INT (f/5): LET f2=f-
5*f1+1
5540 LET d1=INT (d/5): LET d2=d-
5*d1+1
5550 PRINT AT 4*(f1+1),4*(f2+1);
g$;AT 4*(d1+1),4*(d2+1);b$
5560 RETURN
6000 REM
6600 LET c=CODE b$-96: RETURN
7000 DATA "a",28,28,28,8,127,28,
28,20
7010 DATA "b",0,20,20,34,34,34,3
4,62
7020 DATA "c",0,2,6,14,30,62,126
,0
7030 DATA "d",0,31,4,142,255,159
,14,0
7040 DATA "e",0,60,126,213,126,6
0,66,66
7050 DATA "f",4,12,29,127,29,12,
4,0
7060 DATA "g",0,60,36,126,255,66
,0,0
7080 DATA "h",0,126,124,120,112,
96,64,0
7090 DATA "i",16,16,56,124,254,1
6,56,0
7100 DATA "j",8,12,14,15,14,8,12
7,63
7500 REM checks if letter previo
usly hit
7700 LET ch=0
7710 FOR i=1 TO cnt
7720 LET ch=ch+(b(i)=a(c))
7730 NEXT i: RETURN
8010 LET t2=FN f(): PRINT AT 20,
14;(t2-t1)/50;" sec"
8020 PRINT AT 21,3;"again?(y/n)"
8030 IF INKEY$="" THEN GO TO 803
0
8031 LET w$=INKEY$
8032 IF INKEY$<>"" THEN GO TO 80
32
8040 IF w$="y" OR w$="Y" THEN GO
 TO 102
8050 IF w$="n" OR w$="N" THEN GO
 TO 9000
8060 GO TO 8030
8080 SAVE "guess" LINE 1: VERIFY
 ""
9000 REM
```


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The Commodore line

More Commodore routines from Audrey and Owen Bishop. They are designed to move graphics from A to B.



Some machine code routines to help you use the CBM64 multi-colour bit-map mode were described last month. With this mode, pixels can be plotted individually in any one of eight colours. This month we add a routine which draws a straight line from point A to point B. We plotted lines last month but only by using Basic routines to calculate the co-ordinates of each pixel on the line. That made an interesting demonstration but is too slow for any graphics program in which many lines have to be drawn. With this month's routine, LINE, all you need to do is to specify the co-ordinates of A and B and then call the routine.

LINE has another advantage over a Basic line-drawing routine. Unless it is programmed carefully, a Basic routine may possibly leave gaps in the line from time to time. That may not matter for ordinary purposes but, if we intend to use a FILL routine to block in enclosed areas with solid colour, it is imperative that the lines have no gaps. If they do, FILL becomes SPILL. The LINE routine guarantees an unbroken line.

The principle of the routine is simple. In figure one we have the two points, A and B, with a straight line joining them. The shaded squares represent the pixels which must be set to the line colour to draw the line. In the figure, the difference between the x-co-ordinates of A and B (X2-X1) is more than the difference between the y-co-ordinates (Y2-Y1). In other words, the line has a small gradient.

That being so, we begin at A and step along the line one pixel column at a time, plotting a pixel at each step. For each pixel we have to work out in which row it is to be. We first need to calculate the gradient of the line which, in the example of figure one, is 3/20 = .15. Let us see what happens if we have a value – call it g – which we increment by 0.15 each time we move to a new pixel column. We give g the value 0.5 initially, since the centre of pixel A is 0.5 pixels below its top. The sequence of incrementing x by 1 and g by 0.15 runs as shown in table one.

Every few steps, the digit to the left of the decimal point in g increases by 1. That is the step at which the line crosses from one row of pixels to the next. It is the step at which we need to increment y. In the example, y is incremented at columns 7, 13 and 20. The sequence ends with '.5' after the decimal point, since end B of the line is halfway down

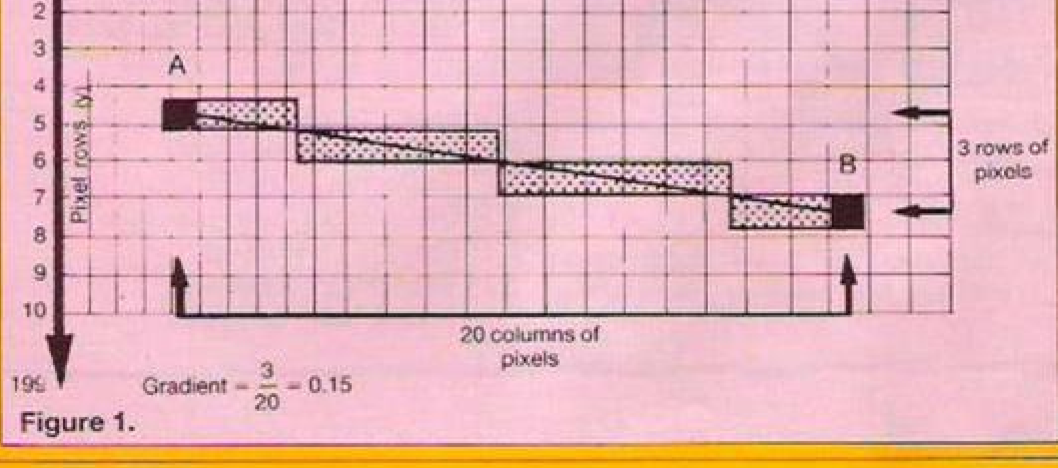


Figure 1.

from the top of the pixel at B. The result of this calculation produces the pattern of pixels shown in figure one. To sum up, we work along the line, incrementing x by 1 at each step and incrementing y by 1 whenever there is a carry-over. We call the PLOT routine to plot a pixel at each step.

That sounds simple but there are complications. The routine needs to be able to handle lines which slope in other directions. It may be necessary to decrement either x or y or both by 1 to obtain the required direction of slope. There is also the problem of what to do if the line is a steep one, with (Y2-Y1) being greater than (X2-X1). The obvious thing is to flip over the routine, exchanging x-parameters with y-parameters. After calculating x and y, we exchange their values again before calling the PLOT routine.

Amazing speed

Computation is complicated by the fact that we need to maintain accuracy in the calculation of g for up to 200 steps along the line. That makes it necessary to work with 16-bit binary fractions. It is amazing how fast the microprocessor copes with it all.

The code for the LINE routine is contained in the DATA statements of listing one, lines 1220-1490. Readers of last month's article will be glad to hear that lines 970 to 1210 are exactly the same as those given then. All you need to do is type-in the additional lines and adapt the graphics program. For the

Table 1

x	g	x	g
3	0.50	13	2.00
4	0.65	14	2.15
5	0.80	15	2.30
6	0.95	16	2.45
7	1.10	17	2.60
8	1.25	18	2.75
9	1.40	19	2.90
10	1.55	20	3.05
11	1.70	21	3.20
12	1.85	22	3.35
		23	3.50

benefit of those who missed the previous article, we outline the essential features of the routines used:

SETUP puts the computer into multi-colour bit-map mode. Call SYS 32768 (line 40).

SCREEN clears the graphics screen and set colours. The colour codes POKEd in line 60 are any of the Commodore colour codes 0 to 7. The background colour is POKEd to 53281. POKE the other 3 colours as shown in line 60, then call SYS 32815 (line 70).

RESET is used as in line 910 to restore

Listing 1.

```
1 REM *** LINE ***
20 PRINT CHR$(147):PRINT"STORING CODE"
30 IF PEEK(33601)<>96 THEN FOR J=32768 T
O 33601:READ X:POKE J,X:NEXT
40 SYS 32768
50 REM ********GRAPHICS PROGRAM ********
60 POKE 53281,5:POKE 40957,0:POKE 40958,
2:POKE 40959,3:REM COL0 TO COL3
70 SYS 32815
80 POKE 40954,2:REM COLOUR NUMBER
90 POKE 40939,10:POKE 40940,5:REM X1,Y1
100 POKE 40941,150:POKE 40942,185:REM X2
,Y2
105 POKE 252,0:POKE 254,0
110 SYS 33173
120 FOR J=1 TO 4000:NEXT
900 REM *****END OF GRAPHICS PROGRAM****
*
910 SYS 32971:POKE 53281,6:POKE 53282,14
920 PRINT CHR$(147):PRINT"PROGRAM FINISH
ED"
930 END
970 DATA 169,128,133,52,133,56,173,24,20
8,9,8,141,24,208,173,17,208,9,32
980 DATA 141,17,208,173,22,208,9,16,141,
22,208,173,2,221,9,3,141,2,221
990 DATA 173,0,221,41,252,141,0,221,96
1000 DATA 169,63,133,253,169,255,133,254
,169,64,133,251,169,31,133,252,162,0
1010 DATA 169,0,129,253,165,253,208,2,19
8,254,198,253,165,251,208,2,198,252,198
1020 DATA 251,208,234,165,252,208,230,32
,98,128,32,157,128,96
1030 DATA 169,231,133,253,169,199,133,25
4,169,232
1040 DATA 133,251,169,3,133,252,162,0,17
3,253,159,10,10,10,10,13,254,159,141
1050 DATA 253,159,173,253,159,129,253,16
5,253,208,2,198,254,198,253,165,251,208
1060 DATA 2,198,252,198,251,208,233,165,
252,208,229,96,169,231,133,253,169
1070 DATA 219,133,254,169,232,133,251,16
9,3,133,252,162,0,173,255,159
1080 DATA 129,253,165,253,208,2,198,254,
198,253,165,251,208,2,198,252,198,251
1090 DATA 208,253,165,252,208,229,96
1100 DATA 173,17,208,41,223,141,17,208,1
73,22,208,41,239,141,22,208
1110 DATA 173,24,208,41,247,9,4,141,24,2
08,173,2,221,9,3,141,2,221
1120 DATA 173,0,221,41,252,9,3,141,0,221
,96
1130 DATA 173,14,220,41,254,141,14,220,1
73,250,159,240,23,170,165,251,41,3,73
1140 DATA 255,56,105,3,168,208,4,138,24,
144,6,138,10,10,136,208,251,141,251,159
1150 DATA 169,0,133,254,133,252,165,251,
41,252,10,144,2,230,252,133,251,165,253
1160 DATA 41,7,141,252,159,165,253,41,24
8,10,38,254,10,38,254,10,38
1170 DATA 254,170,164,254,10,38,254,10,3
8,254,133,253,138,24,101,253
1180 DATA 133,253,152,101,254,133,254,24
,165,253,101,251,133,253,165,254
1190 DATA 101,252,133,254,24,173,252,159
,101,253,133,253,169,224,101,254,133
1200 DATA 254,160,0,165,1,41,253,133,1,1
77,253,170,165,1,9,2,133,1,138
1210 DATA 13,251,159,145,253,173,14,220,
9,1,141,14,220,96
1220 DATA 173,237,159,205,235,159,144,13
,56,237,235,159,133,251,169,1
1230 DATA 141,239,159,16,14,173,235,159,
56,237,237,159,133,251,169,255
1240 DATA 141,239,159,173,238,159,205,23
6,159,144,13,56,237,236,159,133
1250 DATA 253,169,1,141,240,159,16,14,17
3,236,159,56,237,238,159,133
1260 DATA 253,169,255,141,240,159,169,0,
141,249,159,133,252,133,254,141,245,159
1270 DATA 169,128,141,246,159,173,235,15
9,141,247,159,173,236,159,141,248,159
1280 DATA 165,251,141,241,159,238,241,15
9,165,253,141,242,159,238,242,159
1290 DATA 165,251,197,253,176,83,238,249
,159,173,235,159,170,173,236,159
1300 DATA 141,235,159,138,141,236,159,17
3,237,159,170,173,238,159,141
1310 DATA 237,159,138,141,238,159,165,25
1,170,165,253,133,251,138,133,253
1320 DATA 173,239,159,170,173,240,159,14
1,239,159,138,141,240,159,173,241
1330 DATA 159,170,173,242,159,141,241,15
9,138,141,242,159,173,247,159,170
1340 DATA 173,248,159,141,247,159,138,14
1,248,159,165,251,197,253,208,10
1350 DATA 169,255,141,243,159,141,244,15
9,48,98
1360 DATA 165,253,133,254,169,0,133,253,
133,2,162,16,6,253,38,254
1370 DATA 42,168,38,2,197,251,165,2,229,
252,144,12,152,229,251,168
1380 DATA 165,2,229,252,133,2,230,253,15
2,202,208,224,133,254,165,253
1390 DATA 141,244,159,169,0,133,253,169,
0,133,2,162,16
1400 DATA 6,253,38,254,42,168,38,2,197,2
51,165,2,229,252,144,12
1410 DATA 152,229,251,168,165,2,229,252,
133,2,230,253,152,202,208,224
1420 DATA 165,253,141,243,159,173,249,15
9,240,14,173,247,159
1430 DATA 133,253,173,248,159,133,251,16
9,0,240,10,173,247,159,133,251
1440 DATA 173,248,159,133,253,32,240,128
,173,247,159,24,109,239,159,141
1450 DATA 247,159,24,173,243,159,109,245
,159,141,245,159,173,244,159,109
1460 DATA 246,159,141,246,159,144,10,173
,248,159,24,109,240,159,141,248
1470 DATA 159,206,241,159,208,170,173,24
9,159,240,14,173,237,159,133,253
1480 DATA 173,238,159,133,251,169,0,240,
10,173,237,159,133,251,173,238
1490 DATA 159,133,253,32,240,128,96
```

the computer to its normal text mode.

For details of the other routines – COL12, COL3 and PLOT – see last month's issue.

Cobweb of colour

Before calling LINE, you need to POKE memory with the number of the colour the line is to be, and the x and y co-ordinates of the two ends of the line. In the listing, line 80 selects colour 2. In line 60 the background – colour 0 – has been set to colour code 5 and colour 2 has already been set to colour code 2, so the line is drawn in red on a green background. Lines 90 and 100 show how to set the co-ordinates. Remember that the x-co-ordinate must be in the range 0 to 159, while the y-co-ordinate must be in the range 0 to 199. Line 110 calls the LINE routine and the line is plotted.

As explained last time, the computer is configured to leave almost 16K of RAM free for your programs. There is therefore no need to confine yourself to displaying just one line. You have plenty of memory for your imagination to run riot, covering the screen in a cobweb of colour.

There is also some memory space reserved for the machine code graphics routines. The present ones occupy addresses from 32768 to 33601 and from 40939 to 40959. That leaves 33602 to 40938 – just over 7K – free for storing your code or data.

We intend to present two more routines – FILL and PRINTTEXT – later, which will occupy some of this space. If you want to get down to graphics programming in the meantime, it should be safe for you to use memory in the range 34200 to 40800.

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YC/3/87

Tunes on the 128



Dick Sargent looks at the Spectrum 128 and +2 with some sound programs which allow experimentation and play music.

At the heart of the Sinclair Spectrum 128 and Amstrad/Spectrum 128+2 is the programmable sound generator or PSG. Incorporated in the machine-code part of the program ("psgmc") are a few bytes we will use shortly. Don't worry if you do not have "psgmc" since it is included in this month's first demonstration program, which is listing one.

There are two topics covered in this remaining sound article. Listing one continues the Test Bed principle by allowing Basic to change the PSG registers – and registers 11, 12 and 13 are as yet unexamined. Listing two introduces the topic of machine code music. This program is also mostly in Basic, but by using the principles incorporated in it, whole tunes can be written in Z-80 code with no Basic support. As with Test Bed, the listings will also run on the CPC computers.

Sirens and lasers

In the program of listing one only one PSG register is altered by the CALL to 32786 and by embedding this call inside a Basic FOR . . . NEXT loop it is possible to create sounds such as sirens, explosions and accelerating/decelerating cars. In the example of listing one, a laser sound is created every time the <ENTER> key is pressed. When typing-in the program remove the words REM** from those lines which concern your particular computer. If the machine code "psgmc" is not in memory, type-in lines 400 to 590 and remove the word REM from line 105. Although the laser demonstration – lines 110 to 320 – looks complicated, it is all built from the simple format:

```
POKE 32769 with the register number
POKE 32768 with the period value then RANDOMIZE USR 32786
```

Thus one register is loaded with one sound frequency value. The rest of the program is self-explanatory.

PSG registers AMPLITUDE, ENVELOPE-PERIOD and ENVELOPE SHAPE/CYCLE need further explanation. In the previous article PSG register R8 (Channel A Amplitude) was used as a volume control with the values 0 representing zero amplitude (SOUND OFF) and 15 representing maximum amplitude (SOUND ON). If bit 4 of this register is set, then the register is holding a number in excess of 15 and it ceases to become a volume control. In fact, bits 0,1,2 and 3 are ignored and bit 4 (the set bit) acts as a switch which diverts the sound from channel A into a hardware envelope generator. The envelope generator moulds the sound into one of eight shapes – technically it amplitude-modulates the sound. These envelope shapes, when illustrated graphically – see figure one – can be seen to be made up of lines which rise and fall from the minimum sound level to the maximum sound level. They are all basically ramps of one kind or another, and are in two varieties – the endlessly repeating patterns forming a "sawtooth" modulation and the single "one-off" pattern. The patterns are numbered 8 to 15, not 0 to 7 as you might expect. Note that both patterns 11 and 13 terminate with the sound set at full volume, so be careful how you use them. The pattern number you want should be loaded into register R13. The duration of one ramp or envelope cycle is the time it takes for the modulation to change from zero amplitude to full amplitude and it is set by a fine and coarse envelope period value, loaded in registers R11 and R12. A short period gives steep slopes to all the ramps, as shown in figure one, while a long period gives shallow slopes.

Bell synthesis

The envelope registers of the PSG produce complicated waveform patterns which can synthesise a variety of sounds, including those of bells and other percussion instruments. With R8 set at 16, try a succession of numbers in registers R11 and R13 to explore the range available. R12 is the coarse-tune register and is best left holding zero, unless you want some very lengthy envelopes. Load R9 and R10 with zero to turn off channels B and C.

Listing two can be used for a variety of purposes. As it stands it can be used to test the effects of different envelope shapes on musical notes. With slight modifications it can play different notes but the real

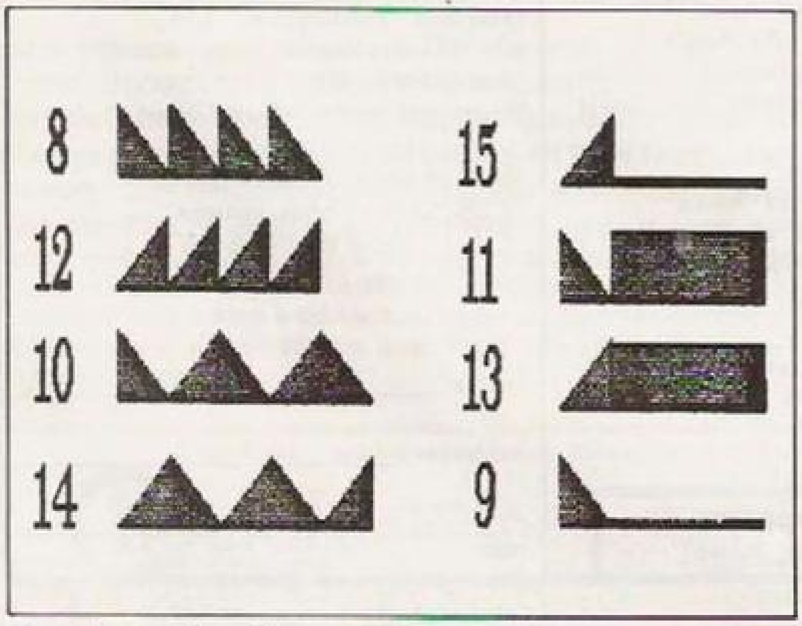


Figure 1 – envelope shapes.

Listing 1.

```
100 REM Spectrum 128 sound -- Listing one
102 REM PSG single register load demo
105 REM GOSUB 400:REM to load "psgmc"
110 RESTORE 320
120 FOR L=1 TO 3
130 READ V:POKE 32769,V:READ V:POKE 32768,V
140 REM** RANDOMIZE USR 32786 : REM *128*
150 REM** CALL 32786 : REM *CPC*
160 NEXT L
170 FOR X=0 TO 255 STEP 30
180 POKE 32769,0:POKE 32768,X
190 REM** RANDOMIZE USR 32786 : REM *128*
200 REM** CALL 32786 : REM *CPC*
210 NEXT X
220 FOR X=255 TO 0 STEP -8
230 POKE 32769,0:POKE 32768,X
240 REM** RANDOMIZE USR 32786 : REM *128*
250 REM** CALL 32786 : REM *CPC*
260 NEXT X
270 POKE 32769,8:POKE 32768,0
280 REM** RANDOMIZE USR 32786 : REM *128*
290 REM** CALL 32786 : REM *CPC*
300 INPUT Z$:IF Z$="A" OR Z$="a" THEN STOP
310 GOTO 110
320 DATA 7,62,8,15,1,1
400 :
410 REM** CLEAR 32767 : REM *128*
420 REM** MEMORY 32767 : REM *CPC*
430 RESTORE 500: LET a=32786
440 FOR r=1 TO 8:READ v:POKE a,v: LET a=a+1
450 NEXT r
460 IF a<32853 THEN  GOTO 440
470 PRINT "Saving m/c to tape/disc..."
480 REM** SAVE "psgmc"CODE 32786,72: RETURN: REM *128*
490 REM** SAVE "psgmc.bin",B,32786,65: RETURN: REM *CPC*
500 DATA 243,30,255,58,1,128,254,7
510 DATA 32,2,30,63,71,58,0,128
520 DATA 163,87,120,205,71,128,251,201
530 DATA 243,221,33,3,128,221,126,7
540 DATA 230,63,221,119,7,175,221,86
550 DATA 0,205,71,128,221,35,60,254
560 DATA 14,32,243,251,201
570 REM** DATA 197,1,253,255,237,121,1,253,
              191,237,81,193,201: REM *128*
580 REM** DATA 245,74,205,52,189,241,201,0,0,0,0,0,0:'*CPC*
590 DATA 0,0,0,0,0,0
```

purpose behind the program is to show how musical notes are presented to the PSG without the help of the 128 PLAY A$ function.

TV speaker tune

If that ubiquitous piece of machine code "psgmc" is not already in the Spectrum, you can append lines 430-590 from listing one to the end of listing two, and alter listing two line 116 to read GOSUB 430.

RUN the program and listen to the little tune given in DATA lines 380-386. It plays through the TV speaker, using channels A and B of the PSG chip. The numbers which you see in these DATA statements are "note-numbers". The notes of just over five octaves (63 notes) have been given numbers, starting with number two for the lowest note A. Middle C is note number 16. Top B is 63. Number 1 is silence, a musical rest.

Period values

These 64 items – 63 notes and the rest – are matched by an array, J(N) which holds 64 PSG period-values. The correct value for each musical note has been calculated by the Basic program which was given previously. When the program wants to play note-number 28, it looks at J(28) and reads the period-value, which is 221. This number must next be split into

The table below is a useful reference aid illustrating the PSG registers.

Register	Function	B7	B6	B5	B4	B3	B2	B1	B0
R0	CHANNEL A TONE PERIOD	8-bit fine tune A							
R1		:::::	:::::	:::::	:::::	4-bit coarse tune A			
R2	CHANNEL B TONE PERIOD	8-bit fine tune B							
R3		:::::	:::::	:::::	:::::	4-bit coarse tune B			
R4	CHANNEL C TONE PERIOD	8-bit fine tune C							
R5		:::::	:::::	:::::	:::::	4-bit coarse tune C			
R6	NOISE PERIOD	:::::	:::::	:::::	5-bit period control				
		--I/O--		----noise----			-----tone----		
R7	ENABLE	x	0	C	B	A	C	B	A
						------volume------			
R8	CHANNEL A AMPLITUDE	:::::	:::::	:::::	ENV	x	x	x	x
R9	CHANNEL B AMPLITUDE	:::::	:::::	:::::	ENV	x	x	x	x
R10	CHANNEL C AMPLITUDE	:::::	:::::	:::::	ENV	x	x	x	x
R11	ENVELOPE PERIOD	8-bit fine tune envelope							
R12		8-bit coarse tune envelope							
R13	ENVELOPE SHAPE/CYCLE	:::::	:::::	:::::	:::::	CONT	ATT	ALT	HOLD

Listing 2.

```
100 REM Spectrum 128 sound -- Listing two
110 REM Machine code music on test, using BASIC
112 CLS
113 CLEAR 32767 **128**
114 REM** MEMORY 32767 **CPC**
115 DIM J(64):GOSUB 121
116 REM either GOSUB 430 or else load "psgmc"
117 GOTO 129
118 :
121 RESTORE 123
122 FOR N=1 TO 64:READ J(N):NEXT
123 RETURN
124 DATA 0,1053,994,938,886,836,789,745,703,664,626,591
125 DATA 558,527,497,469,443,418,395,372,351,332,313,296
126 DATA 279,263,248,235,221,209,197,186,176,166,157,148
127 DATA 140,132,124,117,111,105,99,93,88,83,78,74,70,66
128 DATA 62,59,55,52,49,47,44,41,39,37,35,33,31,29,28
129 LET EPC=0:LET EPF=175:LET SHP=14
130 INPUT "16 FOR ENVELOPE, OR <16 FOR VOLUME ";V
140 INPUT "TEMPO (eg 10) ";T
145 IF V<16 THEN GOTO 180
150 INPUT "SHAPE 8 to 16 ";SHP
160 INPUT "ENVELOPE PERIOD COARSE eg 0 ";EPC
170 INPUT "ENVELOPE PERIOD FINE 2 - &FF eg &B0 ";EPF
180 LET REGN=32769:LET REGV=32768:LET MC=32786
190 POKE REGN,8:POKE REGV,V:RANDOMIZE USR MC
191 POKE REGN,9:POKE REGV,V:RANDOMIZE USR MC
192 POKE REGN,10:POKE REGV,0:RANDOMIZE USR MC
193 POKE REGN,7:POKE REGV,62:RANDOMIZE USR MC
194 POKE REGN,11:POKE REGV,EPF:RANDOMIZE USR MC
195 POKE REGN,12:POKE REGV,EPC:RANDOMIZE USR MC
280 :
285 REM THE "FOR X..." LOOP PLAYS THE TUNE
290 RESTORE 380
300 FOR X=1 TO 62
310 READ N:LET NAC=INT(J(N)/256):LET NAF=J(N)-NAC
320 READ N:LET NBC=INT(J(N)/256):LET NBF=J(N)-NBC
330 POKE REGN,0:POKE REGV,NAF:RANDOMIZE USR MC
331 POKE REGN,1:POKE REGV,NAC:RANDOMIZE USR MC
332 POKE REGN,2:POKE REGV,NBF:RANDOMIZE USR MC
333 POKE REGN,3:POKE REGV,NBC:RANDOMIZE USR MC
334 POKE REGN,13:POKE REGV,SHP:RANDOMIZE USR MC
350 FOR D=1 TO T:NEXT
360 NEXT X
380 DATA 53,32,55,31,56,29,56,29,55,34,53,34,52,36,52,36,53,34,55
381 DATA 34,48,32,48,32,50,31,52,31,53,29,53,29,51,31,49,31,48,32
382 DATA 48,32,46,34,44,34,43,36,43,36,44,34,46,34,48,32,46,32,44
383 DATA 36,43,36,41,29,41,31,53,32,55,31,56,29,56,29,55,34,53,34
384 DATA 52,36,52,36,53,34,55,34,48,32,48,32,50,31,52,31,53,29,53
385 DATA 29,51,31,49,31,48,32,48,32,46,37,44,37,43,39,43,39,44,39
386 DATA 44,39,32,44,32,44,1,1
387 STOP
500 :
502 REM Lines 1000-1040 are optional -- see text
1000 CLEAR 32767:DIM J(64):GOSUB 121
1010 RESTORE 380:LET A=32849
1020 FOR X=1 TO 62
1030 READ N:LET NAC=INT(J(N)/256):LET NAF=J(N)-NAC
1040 LET A=A+1:POKE A,NAF:LET A=A+1:POKE A,NAC:NEXT X
```

the coarse and fine period-values required by the PSG. Note the maths at lines 310 which does this, preparing the way for the register loading operation for channel A, lines 330 and 331. The same thing is done for channel B. Line 334 triggers the sound, while line 350 introduces a delay which gives tempo to the music.

Pure tone music

The program is initialised by loading the J(N) array and then by asking the user for one of five PSG set-up values. For pure-tone music which does not use envelopes, enter the value 15 and for amplitude-modulated music try 16,300,14,0,176. Re-enter the program using GOTO 170 to experiment with different envelopes.

The music for the tune in listing two is stored as DATA statements, translated into period-values in real time and played by the "FOR X=1 TO 62" loop. To lose the Basic completely it is necessary to store the period-values for the tune of your choice as a table in RAM so that a machine code loop can step through the table and send the values found there directly to the PSG. If you want to stick with the tune in listing two, add lines 1000-1040 to that listing and execute RUN 1000. A table of values for the 62 notes will be sent to RAM starting at address 32850 and finishing 124 bytes later at 32974. Save the bytes on tape for later. All the Basic can be killed by executing NEW and a machine code routine similar to the one shown in listing three can be written to play the 62 notes.

Listing 3.

```
;SPECTRUM 128 --
 LISTING THREE

;MACHINE-CODE TUNE
 SOURCE CODE

   ORG 32980

TABLE: EQU 32850
COUNT: DB 100

;RUN USING
;RANDOMIZE USR 32981

;FIRST INITIALISE PSG,
 CH A

    DI
    LD D,0
    LD A,6
L1: CALL PSG
    DEC A
    JR NZ,L1
    LD A,8
    LD D,15
    CALL PSG   ;CH A ON
    ;
    ;NOW STEP THRU TABLE

    LD HL,TABLE
    LD B,62     ;62 NOTES
L2: LD D,(HL)
    LD A,0
    CALL PSG   ;LOAD R0
    INC HL
    LD D,(HL)
    LD A,1
    CALL PSG   ;LOAD R1
    INC HL
    CALL TEMPO ;WAIT
    DJNZ L2
    ;finished
    LD A,8
    LD D,0
    CALL PSG   ;CH A OFF
    EI
    RET ; ---> TO BASIC

TEMPO: LD A,(COUNT)
L3: LD C,0
L4: DEC C
    JR NZ,L4
    DEC A
    JR NZ,L3
    RET

PSG:PUSH BC
    LD BC,0FFFDH
    OUT (C),A
    LD BC,0BFFDH
    OUT (C),D
    POP BC
    RET

    END
```

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Portable dream



If small is beautiful then the Bondwell lap-top should be the answer to many people's prayers. Geof Wheelwright assesses its performance and value.

The world of dreams is not entirely logical, particularly when it concerns journalists. Whenever computer journalists start musing about the perfect computer, it always emerges as something which features the best word processing software in the world, operates at the speed of a Cray 1, works on batteries and fits inside a briefcase.

In short, we are obsessed with portable computers. From the word 'go' we have been unashamed proselytisers of the lap-held machine. From the first Tandy 100 computers, with little 8-line LCD screens and 8K memories to today's giant 640K RAM AT-compatible Toshiba T-3100s, we have been the portable computer's biggest boosters. Even when the computer industry insisted there was no widespread market for portables, we stuck to our guns – giving massive coverage to any corporate Tom, Dick or Harry who offered as much as a sniff or a portable computer with batteries.

Now, however, our dreams look set to come true. New battery-operated portables are expected from the likes of Sir Clive Sinclair, Compaq Computer – which started the whole IBM-compatible portable computer business – and even arch-conservative Alan Sugar. All those manufacturers are going to have to work hard, however, if they are to produce a portable computer which offers better value and performance than this month's dream machine – the Bondwell BW8.

Future familiarity

Bondwell may not be a familiar name but if the company's portable computer is any indication of the value it intends to offer, I am sure you will hear more about it in the future. Hongkong-based Bondwell produces a range of PC-compatible computers – sold in the U.K. exclusively through the Spectrum Group.

The BW8 is a PC-compatible portable which weighs less than 10lb., offers a rechargable battery life of up to six hours, includes 512K RAM and a built-in 3.5in. 720K disc drive, with disc formats compatible with the new Convertible portable computer, as well as the Atari 1040STF and the Apricot Xen. Other features include a plug for an external 2.5 or 5.25in. disc drive, parallel and serial ports, RGB and composite video outputs, a built-in backlit 80-column by 25-line LCD screen and a carrying handle. The latter feature may seem scarcely worthy of mention but the fact is that many



lap-held computers which claim to be portable do not include a carrying h-ndle. After several months ging various portabl puters on trains, airc buses, I was tremendously glad of this low-tech feature of the BW8.

Value for money

Carrying handles aside, the most dreamlike quality of this whole package is the price – £799 plus VAT. With the addition of a 5.25in. external drive for copying your favourite non-protected software to 3.5in. disc, the price of the whole system is still less than £1,000 – something which would have been remarkable value for a PC-compatible even a year ago, let alone for a battery-operated portable with built-in LCD screen.

By now, you are probably thinking there has to be some fatal flaw in this little dream – some incompatibility threatening to turn the whole affair into a nasty nightmare. The BW8 is as PC-compatible as they come – and a good deal more compatible than some other portables. It does, admittedly, use non-standard serial and parallel ports but Bondwell offers its own low-cost connector cables for each – the parallel cable being a standard connector to an Epson-style parallel port and the serial cable offering a standard 25-pin male RS232 socket.

The only other incompatible feature is that you cannot expand the BW8 RAM beyond 512K. I would have to think long and hard to find any portable computer application – and few desk-top applications – requiring more than 512K.



Even when using two applications at once, I found no problems with the 512K limit. I used the Psion *Xchange* word processor to take notes at various meetings and press conferences and kept the Lattice Software *SideTalk* memory-resident background communication software program in RAM at all times, so that I could send information to my office via a modem.

The final test of compatibility for the BW8 was in running the Microsoft *Flight Simulator* program. Flight Simulator is one of the few applications for the PC which does not use the MS-DOS operating system but relies on a fully-compatible IBM BIOS being resident in the computer. If a PC is not compatible, it will not run Flight Simulator.

The last word

The BW8 ran Flight Simulator with flying colours – in both the RGB colour mode, using an external monitor connected to the BW8 monitor port, and on the backlit LCD screen. It also had no problems using a configuration of the Flight Simulator set-up for the IBM Convertible lap-held computer.

The last word about the BW8 should concern its display screen. That is where most portable computers fall down – either the screen is awful and renders the whole computer unusable, or it is brilliantly clear but draws so much power that you can no longer use the machine under battery power.

The BW8, I am happy to report, has an adequate LCD display screen – helped considerably by the backlighting feature, which can be switched on and off to save battery power when there is sufficient ambient light to see the screen without backlighting. That is not to say it is the best LCD screen in the world – slightly better screens are offered on the Zenith X-181 and Tava Flyer machines – but the BW8 LCD panel is far better than non-backlit LCDs and provides a clear and readable display without using excessive power.

No awakening

The best thing I can say about my encounter with this dream machine is that it was a dream from which I did not wish to wake. Reverting to the real world of pen and notebook journalism will be difficult after having a wonderful lap-held portable like the BW8 in my office for two months.

At the low prices Bondwell is asking for this machine, this may just be one time that my dreams become a reality.

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ADVERTISERS INDEX

TECHNOLOGY SO ADVANCED ...



MEMORY
- 512Kbytes RAM (520ST-M, FM)
- 1024Kbytes RAM (1040ST-F)
- 192Kbytes ROM
- 128Kbytes external plug-in ROM option

ARCHITECTURE
- *Motorola 68000 Central Processing Unit (CPU) with a clock speed of 8MHz*
- *16-bit external data bus*
- *32-bit internal data bus*
- *24-bit address bus*
- *8×32-bit data & address registers*
- *7 levels of interrupts*
- *56 instructions*
- *14 addressing modes*
- *5 data types*
- *DMA (Direct Memory Access)*
- *real time clock as standard*

GRAPHICS
- *full bit-mapped display*
- *palette of 512 colours*

Using Atari Monitors (on 520 & 1040):
- *640×400 high resolution - monochrome*
- *640×200 medium resolution - 4 colours*
- *320×200 low resolution - 16 colours*
- *80 column text display (40 col low res)*

Using Domestic TV (on 520):
- *640×200 medium resolution - 4 colours*
- *320×200 low resolution - 16 colours*
- *40 columns × 25 line text display*

SOUND AND MUSIC
- *3 programmable sound channels*
- *frequency programmable 30Hz - 125KHz*
- *programmable volume*
- *wave & dynamic envelope shaping*
- *programmable attack, decay, sustain, release*
- *Musical Instrument Digital Interface (MIDI)*
- *MIDI allows connection of synthesisers etc.*

STANDARD SOFTWARE
- *GEM desktop + TOS operating system*
- *ST BASIC interpreter/language system*

MOUSE
- *high precision*
- *2 button control*
- *free with 520ST-FM/1040ST-F*
- *non slip ball motion sensor*
- *removable ball for easy cleaning*

INPUT/OUTPUT
MIDI out	*(5 pin DIN) 31.25K baud*
MIDI in	*(5 pin DIN) 31.25K baud*
audio out	*1.0V DC peak to peak, 10K ohm*
audio in	*1.0V DC peak to peak, 10K ohm*
RGB monitor	*1.0V DC, 75 ohm*
mono monitor	*1.0V DC, 75 ohm*
mono horizontal scan rate	*35.7KHz*
mono vertical scan rate	*71.2KHz*
sync	*5V DC (active low) 3.3K ohm*
modem/serial	*RS232C, 50 to 19,200 baud*
floppy disk	*250 Kbits/s*
hard disk	*11.3 Mbits/s*
mouse	*standard Atari connector*
joystick	*standard Atari connector*
cartridge port	*128K capacity*
RF output (520ST-FM)	*for TV use*

OPERATING SYSTEM
- *TOS with GEM environment in ROM*
- *hierarchical file structure with sub-directories and path names*
- *user interface via GEM, with self explanatory command functions*
- *multiple windows + icons*
- *window resizing, re-positioning and erasing*
- *drop down menus (selected by mouse)*
- *GEM virtual device interface*

COMMUNICATIONS
- *RS-232C serial modem port*
- *8-bit parallel printer port*
- *MIDI port (also for networking use)*
- *VT52 terminal emulation*

KEYBOARD
- *standard QWERTY typewriter format*
- *95 full stroke keys*
- *10 function keys*
- *18 key numeric keypad + cursor keys*
- *variable auto-repeat & key click response*
- *keyboard processor reduces CPU overhead*

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FREE STARTER KIT - Only From Silica

When you purchase any Atari ST keyboard, you will not only receive the best value for money computer on the market, but you will also receive the following from Atari Corporation as part of the package:

** BASIC Language Disk * BASIC Manual * ST Owners Manual * TOS/GEM on ROM*

If you buy your ST from Silica Shop, you will also receive:

** NEOchrome - colour graphics program * 1st Word - Word Processor*

In addition, we at Silica would like to see you get off to a flying start with your new computer, so we have put together a special **ST STARTER KIT** worth over £100, which we are giving away **FREE OF CHARGE** with every ST computer purchased at our normal retail prices. This kit is available **ONLY FROM SILICA** and is aimed at providing users with a valuable introduction to the world of computing. We are continually upgrading the ST Starter Kit, which contains public domain and other licensed software, as well as books, magazines and accessories all relevant to ST computing. Return the coupon below for full details.

DEDICATED SERVICING - Only From Silica

At Silica Shop, we have a dedicated service department of five full time Atari trained technical staff. This team is totally dedicated to servicing Atari computer products. Their accumulated knowledge, skill and experience makes them second to none in their field. You can be sure that any work carried out by them is of the highest standard. A standard of servicing which we believe you will find **ONLY FROM SILICA**. In addition to providing full servicing facilities for Atari ST computers (both in and out of warranty), our team is also able to offer memory and modulator upgrades to ST computers.

1Mb RAM UPGRADE: Our upgrade on the standard Atari 520ST-M or 520ST-FM keyboard will increase the memory from 512K to a massive 1024K. It has a full 1 year warranty and is available from Silica at an additional retail price of only £86.96 (+VAT = £100).

TV MODULATOR UPGRADE: Silica can upgrade the 1040ST-F to include a TV modulator so that you can then use it with your TV set. This is an internal upgrade and does not involve any untidy external boxes. A cable to connect your ST to any domestic TV is included in the price of the upgrade which is only £49 (inc VAT). The upgrade is also available for early 520ST computers at the same price.

THE FULL STOCK RANGE - Only From Silica

We aim to keep stocks of all Atari related products and our warehouse carries a stock of £½ million. We import many software titles direct from the USA and you will find that we have new releases in advance of many of our competitors. Unlike dealers who may only stock selected titles, we have the full range. In addition, we carry a complete line of all books which have been written about the Atari ST. A range as wide as ours is something you will find is available **ONLY FROM SILICA**.

AFTER SALES SUPPORT - Only From Silica

Rest assured that when you buy your ST from Silica Shop, you will be fully supported. Our free mailings give news of releases and developments. This will help to keep you fully up to date with what's happening in the Atari market. And in addition, our sales staff are at the end of a telephone line to service all of your Atari requirements. If you purchase an ST from Silica and would like any programming or technical advice, we have a full time technical support team to help you get the best from your computer. Because we have both the staff and the systems specifically dedicated to providing after sales service on Atari ST computers, we are confident that our users enjoy an exceptionally high level of support. This can be received **ONLY FROM SILICA**.

FREE CATALOGUES - Only From Silica

At Silica Shop, we recognise that serious users require an in-depth information service, which is why we mail free newsletters and price lists to our ST owners. These are up to 48 pages long and are crammed with technical details as well as special offers and product descriptions. If you have already purchased an ST and would like to have your name added to our mailing list, please complete the coupon & return it to us. The information service is available **ONLY FROM SILICA**.

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520ST-M

The affordability of Atari computers is reflected in the price of the 520ST-M keyboard, which is a mere £259 (inc VAT). This version of the ST comes with 512K RAM, as well as a modulator and lead for direct connection to any domestic TV. The price does not include a mouse. In addition, when you buy your 520ST-M from Silica, you will also receive the FREE Silica 'ST Starter Kit'. During 1987, many software houses will be producing games software on ROM cartridges, which will plug directly into the cartridge slot on the 520ST-M keyboard, giving instant loading without the expense of purchasing a disk drive. With the enormous power of the ST, you can expect some excellent titles to be produced, making this the ultimate games machine! If your requirement is for a terminal, then the 520ST-M can fulfill this role too. Leads are available to connect the ST to a variety of monitors, and with the imminent introduction of terminal software on ROM cartridge, the ST provides a low price terminal for business use. If you wish to take advantage of the massive range of disk software available for the ST range, you will need to purchase a disk drive. Atari have two floppy disk drives available, a ½ Mbyte model £149 and a 1Mbyte model £199. Full details of these drives, as well as the Atari 20Mbyte hard disk are available on request. If required at a later date, the mouse may be purchased separately.

£259

520ST-FM

The 520ST-FM with 512K RAM and free mouse, represents a further breakthrough by Atari Corporation in the world of high power, low cost personal computing. This model is the latest addition to the ST family, and is not only powerful, but compact. It is priced at only £399 (inc VAT) a level which brings it within the reach of a whole new generation of computer enthusiasts. When purchased from us, it comes with the FREE Silica 'ST Starter Kit' see paragraph on the left. To make the 520ST-FM ready for use straight away, Atari have built into the keyboard a ½ megabyte disk drive for information storage and retrieval, allowing you easy access to the massive range of disk based software which is available for the ST. This new computer comes with all the correct cables and connections you will need to plug it straight into any standard domestic television set. You do not therefore have to purchase an Atari monitor. If you do require a monitor however, these are available with the 520ST in the following money saving packages:

520ST-FM Keyboard	*Without Monitor*	- **£399** *(inc VAT)*
520ST-FM Keyboard	*+ High res mono monitor*	- **£499** *(inc VAT)*
520ST-FM Keyboard	*+ Low res colour monitor*	- **£599** *(inc VAT)*
520ST-FM Keyboard	*+ Med res colour monitor*	- **£699** *(inc VAT)*

Because the 520ST-FM has its own power transformer built into the keyboard, there are no messy external adaptors to clutter up your desk space. You are left with only one mains lead, serving both the disk drive and the computer. You couldn't ask for a more stylish and compact unit.

£399

1040ST-F

For the businessman and the more serious home user, Atari have their most powerful model, the 1040ST-F with 1028K RAM. This low cost powerhouse can be introduced into a business environment as a stand-alone system, or can support a mainframe computer as a terminal. The 1040ST-F not only features twice as much memory as the 520ST-FM, but also includes a more powerful built-in disk drive. The drive featured on the 1040ST-F is a one megabyte double sided model. The extra memory facility of the 1040ST-F makes it ideal for applications such as large databases or spreadsheets. Like the 520ST-FM, the 1040ST-F has a mains transformer built into the console to give a compact and stylish unit with only one mains lead. The 1040ST-F is also supplied from Silica Shop with a free software package and 'ST STARTER KIT'. In the USA, the 1040ST-F has been sold with a TV modulator like the 520ST-FM. However, for the UK market, Atari are manufacturing the 1040ST-F solely with business use in mind and it does not currently include an RF modulator, this means that you cannot use it with a domestic TV (Silica Shop do offer a modulator upgrade for only £49). The 1040ST-F keyboard costs only £599 (inc VAT) and, unless a modulator upgrade is fitted, will require an Atari or third party monitor. There are three Atari monitors available and the prices for the 1040 with these monitors are as follows:

1040ST-F Keyboard	*Without Monitor*	- **£599** *(inc VAT)*
1040ST-F Keyboard	*+ High res mono monitor*	- **£699** *(inc VAT)*
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1040ST-F Keyboard	*+ Med res col monitor*	- **£899** *(inc VAT)*

The 1040ST-F comes with a mouse controller and includes 1Mbyte of RAM. It has a 1Mbyte double sided disk drive and mains transformer, both built into the keyboard to give a compact and stylish unit, with only one mains lead.

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